SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 5, 1946

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Largest Flying Boat

See Page 3

A SCIENCE SERVICE PUBLICATION

GEOLOGY

Steam Made Crater

Volcanic explosion and not meteorite caused Arizona's famous landmark. Evidence supporting theory is another crater with cinder cone in center.

➤ ARIZONA'S famous crater, usually referred to as Meteor Crater, was not caused by the impact of an enormous projectile from outer space at all, declared Dr N H Darton of the U S Geological Survey before the annual meeting of the Geological Society of America in Pittsburgh Persistent search for the supposed deeply buried meteorite, on which more than $1,500,000 has been expended, has merely proved that it isn't there, he told his audience

Dr Darton has always believed that this remarkable crater was produced by a volcanic steam explosion As supporting evidence, he pointed out the facts that it is in a volcanic region, and that a smaller but similar crater, Zuni Salt Lake, 120 miles to the east, has a cinder cone in its center For this reason, Dr Darton years ago gave the formation the name Crater Mound, and this name has been officially adopted by the U. S Board of Geographic Names, thus becoming obligatory for use on all approved maps

How Ploesti Was Found

➤ AMERICAN geologists were able to help American fighters on all fronts in their world-wide war, through their detailed knowledge of the terrain and the rock and soil formations that lay under the surface. The importance of military geology was discussed in some detail at the meeting.

Nazi camoufleurs had succeeded in so thoroughly hiding the famous Ploesti oil center in Rumania that our bombers could not find it. Geologists showed them what the surrounding hills and fields looked like, by means of a new kind of map, known as a terrain diagram By taking their bearings on this picture, our raiders made a second visit —and dropped their calling cards right on the tray.

Prof L. Dryden of Bryn Mawr College told of some of the other questions American geologists were called upon to answer before raids could be made or beach landings attempted Where were the best sites for airfields on the Solomon Islands? What kind of terrain would ground forces have to fight over on Madagascar What camouflage equipment should be taken to Sicily? Quick answers were found for these questions, and many others

Geologists also helped in getting roads, airfields and other installations built, Prof C S Denny of Connecticut Wesleyan University told his colleagues If engineers were told in advance whether the soil was soft or rocky, they would know how many bulldozers to take along, and how much dynamite for blasting Drainage and water supplies were other important matters in which geological knowledge went in along with the first working crews, saving much time and effort

Hardest Grinding Wheels

➤ HARDEST grinding wheels in the world, useful in a score of industrial applications, were described before the meeting by C R Van Riper of the research laboratories of the Norton Company, well-known makers of abrasives These are small wheels made of bits of diamond, bonded together with various substances, the hardest of all, and hence the keenest-cutting, being vitrified-bonded.

Such wheels are used for shaping and dressing tools whose very names have themselves become synonyms of harness, like cemented carbide tools, as well as hard gem stones, quartz and other resistant materials Diamond wheels are also useful for precision work, especially in the production of lenses and small steel parts where dimensional tolerances are small

Fossil Pollen in Coal

➤ BACK ON their peacetime jobs, geologists are putting their best efforts into locating and evaluating new sources of ores, minerals and fuels Robert M Kosanka of the Illinois Geological Survey told how fossil pollen grains and plant spores, embedded in coal formations for a third of a billion years, are being studied in the hope of locating r coal beds in the Midwest.

These minute fossils, which can b separated from the coal only by the most painstaking methods, came from the giant fern-like trees and enormous relatives of horsetail rushes that formed the forests of those days and left their remains in the coal seams Abundance and distribution of pollen grains and spores may serve as guides to coal deposits still awaiting discovery

Science News Letter, January 5, 1946

SAFETY

Explosion Probably Caused Kentucky Mine Disaster

➤ MOST PROBABLE cause of the Pineville, Ky, coal mine disaster, which entombed over 30 men, is an explosion of natural gas accumulated over the Christmas holiday, say officials of the U S Bureau of Mines.

While there can be no final confirmation of this fact until the mine is cleared, it is believed that the four-day work stoppage allowed the mine's usual 1% to 2% of methane gas in the air to exceed the 5% danger point

Use of electrical equipment such as coal loaders and cutters may have caused an arc or flame to ignite a gas pocket Ignition of only 150 cubic feet of gas would have been sufficient to set off concussions stirring up coal dust and causing numerous explosions to follow Coal dust has been found to be highly explosive and precautions often do not overcome this danger

"Relatively few states," Daniel Harrington, chief of the health and safety branch of the U S Bureau of Mines, said, "require electrical equipment of assured safety"

Much equipment is used which could easily cause an arc or flame to ignite the gas Careless striking of a match might also have set off the explosion

Great danger faced the rescuing crews attempting to reach the miners. If any gas remained trapped in the mine, movement of air with the renewal of ventilation may move the gas out of the trap and push it within explosive distance of the many fires that are being encountered in the tunnel

This mine disaster, Mr Harrington noted, will bring the total mine injuries for 1945 to some 80 or 90

"Irrespective of this disaster," Mr Harrington said, "1945 gives the lowest rate of accidents in coal mining history"

Science News Letter, January 5, 1946

GEOLOGY

Prehistoric Hunting

Fifty or more fossil skeletons of giant buffalo have been found in a quarry on the High Plains of northwestern Texas.

➤ THERE was good hunting in Texas even in prehistoric times Fifty or more fossil skeletons of giant buffalo, much bigger beasts even than modern bison, have been found in a quarry on the High Plains of the northwestern part of the state, Prof E H Sellards of the University of Texas told the Geological Society of America at its meeting Among the bones were 27 arrow-heads and knives, showing that primitive hunters had made a highly successful kill and cut up their quarry for feasting, or perhaps to dry in the sun and store for future use

The find, which occupies a sandy layer some 500 square feet in extent and from a few inches to one and one-half feet in thickness, is in a situation that indicates that the hunters managed to drive the herd over a bluff into a river bed, probably killing more by falling and suffocation than by direct attack with weapons Remains of a wolf, the only other large animal found in the excavation, suggests the presence of uninvited guests at the slaughter

Hills Now Deeply Buried

➤ THE HISTORY of six hills that became islands and are now deeply buried beneath massive layers of limestone was told by Robert F Walters, oil geologist of Tulsa, Okla Half a billion years ago, Mr Walters stated, an ancient land surface was eroded in what is now central Kansas Six spots, where the formation consisted of quartzite, proved resistant to the erosion and remained standing above the ancient landscape as flat-topped hills

Then the whole region slowly sank beneath the sea, leaving the hills above waterline as islands The lagoons and channels among them silted up, and at the same time the bottom continued to sink, until finally even the islands were submerged and buried.

Ages later, the land re-emerged from the sea Erosion again set in The softer, later-deposited sediments were washed away, leaving the one-time islands again hills

Once again the sea invaded the western lands. This time submergence became deeper and deeper, and layer upon layer of limy bottom silt gradually hardened into stone Even today, long after a second re-emergence, there are still 3,300 feet of limestone above the tops of the six ancient hills

This interesting feature of the deeply-buried topography of ancient Kansas was discovered, and its details worked out, during the course of explorations for oil pools

Medal to Geophysicist

➤ A FEATURE of the proceedings was the presentation of the Penrose Medal of the Geological Society of America to Prof F A Vening Meinesz of the University of Utrecht, who is now in this country as Delegate for Science of the Netherlands Government Dr Meinesz is the inventor of a multiple pendulum which can be swung in a ship and used to measure the value of gravity beneath the sea bottom Using this in submarines, he discovered a number of extraordinary regions of gravitational irregularities or anomalies. Dr Meinesz is the sixteenth recipient of the Penrose Medal

Science News Letter, January 5, 1946

AERONAUTICS

Flying Boat of Plywood To Be World's Largest

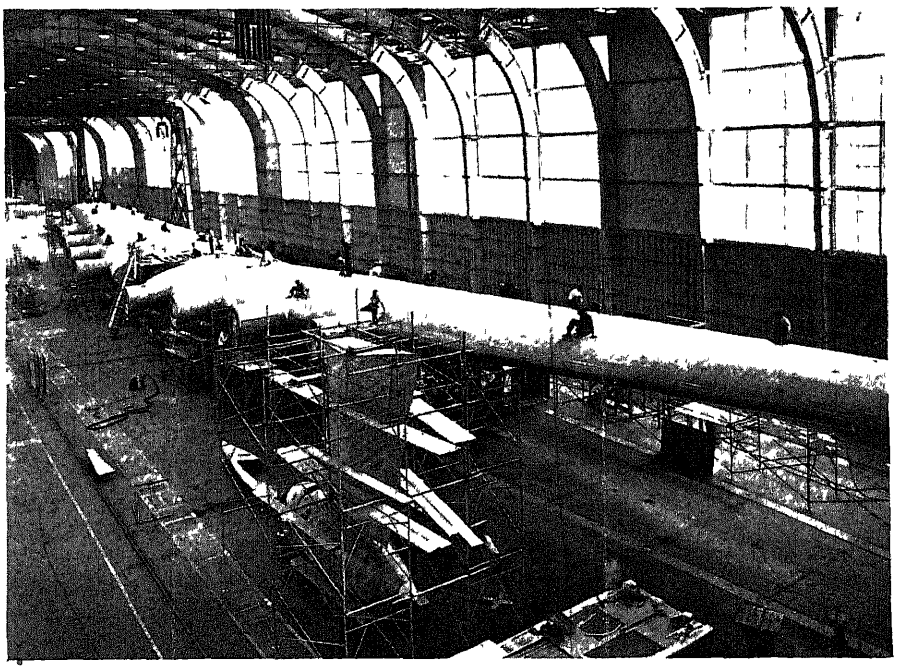
See Front Cover

➤ AN EIGHT-MOTORED flying boat three times as heavy as the previous world's largest, the "Mars," is nearing completion in Culver City, Calif A novel view of the interior is shown on the front cover of this SCIENCE NEWS LETTER

The new boat, designated by the manufacturer as the H-4, weighs over 200 tons, and is 200 feet long, with wing spread of 320 feet It is powered by eight 3,000-hp motors, each with 4-bladed propellers 17 feet across Forty-two tons of gasoline may be carried in its 14 tanks, and the hold is large enough to carry a B-17.

As a hospital ship it could accommodate 350 patients on stretchers, plus doctors, nurses and equipment Its cruising speed is 175 miles per hour, with a landing speed of 78 miles per hour Take-off distance of over a mile is required

Aside from its spectacular size, the most unusual feature of the Hughes H-4



WING SPAN 320 FEET—Some idea of the size of the flying boat may be gained from this view of the wing panels of the H-4. Note the workmen as they appear in comparison with the parts on which they are working.

is its virtually all-wood construction. The only metal parts are forward of the fin walls in the eight engine nacelles Solid wood could not be used Trees do not grow large enough, and natural wood has too many inherent defects Therefore plywood is used throughout for the frame of the hull, wings, tail surfaces, ribs, and for the covering of all major assemblies Fabrication of these giant components is achieved by laminating and cross-plying selected wood veneers, using synthetic resin adhesives The adhesive must be stronger and more durable than the wood itself, and must be completely water resistant The curved sections are produced by the now familiar bag molding process This involves the use of a mold, over which layers of adhesive-coated veneers are laid cross-grained The assembly is enclosed in a rubber bag, from which air is exhausted by vacuum, and then placed in an autoclave where steam furnishes both heat and pressure to fuse the veneers into a single solid structure.

The thickness of the veneers varies from 1/48 to 1/2 inch, and the synthetic resin adhesive must possess characteristics which will permit it to cure properly under the various required temperatures. Each of the millions of glued joints in wood construction must possess the necessary strength and show no deterioration

Science News Letter, January 5, 1946

CHEMISTRY

Synthetic Fibers Research

➤ A SERIOUS WARTIME shortage of natural fibers in Germany, for clothing, canvas and rope, forced concentrated research, it is now revealed, directed toward the production of synthetic fibers with wool-like properties, and replacements for jute, sisal and hemp to make baling materials, rope and twine

Germany obtained considerable wool from conquered countries, but the amount was insufficient for military uniforms Its supply of cotton and rope-making fibers was very limited. Even before the war the plan of the Reich government was to make Germany independent, as far as possible, of the importation of raw materials for fibers, and also of natural fibers

In the case of cotton, this was accomplished to a marked degree by the expansion of the rayon staple and tire yarn industries, but it was recognized that rayon staple fibers would not be entirely satisfactory for outside wearing apparel and for many technical and industrial uses.

German activities in the development of synthetic fibers have been studied on the ground since the close of the war by J. B Quig of E I du Pont de Nemours and Company under a program of investigating German industrial and chemical methods sponsored by the United States government His report is now released by the Office of the Publication Board, U S Department of Commerce

The shortage of iron, steel and other metals, the report says, greatly stimulated the rapid development of hydrocarbon polymers and copolymers for the plastics industry Some of these polymers were capable of being made into fibers, and determined efforts were made to find polymeric fibers which would augment the natural fiber economy

In the development of wool-like fibers, three lines of approach were followed These were the modification, physically or chemically, of viscose and acetate rayon fibers, the preparation of a synthetic protein fiber, and the application of water repellents to the fiber or fabric

By the first line of approach, a crimped cellulose fiber of viscose, cuprammonium or acetate solutions was obtained that duplicates fairly successfully the superficial characteristics and processing characteristics of wool, but obtained only a limited success in imparting water repellency, permanence of crimp, and resiliency of handle

Many other synthetic fibers are reviewed by the investigator. His conclusion, relative to the status of wholly synthetic fibers in Germany, however, is that progress in the United States compares favorably with it

Science News Letter, January 5, 1946

ENGINEERING

Cable Controls Operation On Bulldozer Tractors

➤ BULLDOZER operators, whether levelling Army airfields or building civilian roads, will welcome a new single-drum front-mounted cable control to raise or lower the heavy earth-cutting blade which is pushed forward by a caterpillar tractor The new cable control, simple and easy to operate, is mounted where readily accessible on the front of the tractor

This cable control is of compact design, permitting close mounting to the tractor. Cast-steel structural members and cast-steel case provide structural strength Anti-friction bearings used throughout contribute to the ease of handling The control embodies the smooth-performing multiple-disk type clutch that has proved satisfactory in the past

Science News Letter, January 5, 1946

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CHEMISTRY

Nazis Made Peroxide

New process developed during the latter days of the war through the use of easily oxidized organic materials, it is now revealed.

➤ WAR-ESSENTIAL hydrogen peroxide was made in Germany during the latter days of the European conflict through the use of easily oxidized organic materials, it is now revealed Production by this new commercial method was still on a small scale at the end of hostilities, but large-scale production appears to be feasible

Conventional commercial methods of making hydrogen peroxide are electrochemical reactions involving the oxidation of solutions of sulfuric acid or ammonium sulfate It has been known for some time that reactions involving the oxidation of easily oxidizable organic materials and the extraction of the resulting peroxide with water could be used, however, many factors limited the interest in these processes to laboratory investigation

The methods discovered in Germany, in the Ludwigshaven plant of I G Farben Industries, were developed by two German chemists The organic material used was 2-ethylanthraquinone The pilot plant in use had a capacity of over a ton of peroxide a day Plans, however, had been drawn up for building a plant with a capacity 12 times as great, but construction had not been started when the war ended

The process is covered by a German patent issued in 1941, of which copies are available in the United States The value of the discovery to America is that the feasibility of large-scale production of peroxide with relatively simple and inexpensive equipment by non-electrolytic methods has been proved

Concentrated hydrogen peroxide has been called a new chemical tool which has many uses in industrial processes The Germans used huge quantities in auxiliary devices for launching airplanes, V-bombs, naval torpedoes, jet-propelled planes and unmanned tanks. The production and use of this material were rated a top military secret by German authorities and elaborate precautions were taken to safeguard all information concerning them

The information relative to this German method of making hydrogen peroxide was obtained during the postwar investigations of chemical production methods in Germany made by American scientists The Ludwigshaven plant was visited and reported on by Ensign W G Gormley of the U S Navy The report has just been released by the Office of the Publication Board, U S Department of Commerce, and can be obtained by those interested

Among other hydrogen peroxide plants visited and reported on is the giant peroxide factory at Bad Lauterberg, investigated by Lt. Col Max Woldenberg of the Chemical Warfare Service Construction of this plant was begun in 1939, two units were completed by the summer of 1941, two more in 1942, and a fifth in December 1944 Each of the five units had a capacity of 240 tons a month, 80% basis. The plant used the electrolytic method, starting with the electrolysis of ammonium bisulfate

Science News Letter, January 5, 1946

CHEMISTRY

D.D.T. Spraying of Pasture Can Make Milk Poisonous

➤ DDT SPRAYING of pastures or woodlands where dairy cattle graze may expose users of their milk to danger of poisoning, it is indicated by results of experiments reported by Drs Horace S. Telford and James E Guthrie of the research laboratories of Drs Hess and Clark, Inc , of Ashland, Ohio

The two experimenters first fed toxic doses of DDT to nursing female rats The animals developed typical symptoms of DDT poisoning, and shortly thereafter the same symptoms appeared in their suckling young Practically all of the rats died

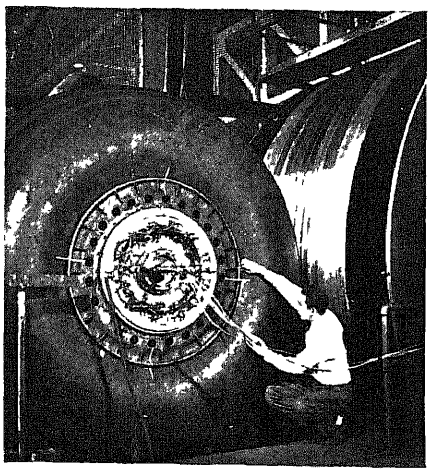
In another experiment the DDT was given to milch goats in rather heavy doses, and their milk given to adult rats Again there was high mortality among the rats, though the goats survived There was even a transmission of the poison: female rats receiving the milk had their milk poisoned in turn, for their young died The poisoned milk from the goats seemed to have no ill effects on nursing kids, however.

Evidence was obtained that the poisonous principle is transmitted in the butterfat, for butter made from the poisoned goats' milk produced DDT symptoms when fed to rats.

Another ill effect of DDT on milk-producing animals was observed milk flow was suppressed in the poisoned goats in from three to four weeks

Another suggested possible source of DDT poisoning in dairy cattle is the habit cows have of licking their own skins Thus, a cow getting in the way of a DDT sprayer could easily transfer much of the poisonous chemical from her skin to the milk. Goats do not have this licking habit Goats receiving DDT spray on their skins remained unaffected, which is taken as evidence that the DDT is not absorbed directly through the skin.

Science News Letter, January 5, 1946



BOMBER TEST—This massive testing machine simulates landing effect of future giant bombers. This three-quarter-ton tire stops the 158 ton steel inertia wheel in 20 seconds. The 110-inch tire is slammed against the steel wheel as the steel speeds around at two miles a minute, simulating actual landing conditions without risking personnel or equipment.

Cabbage-breeding for a high vitamin C content has already produced some lines with vitamin value exceeding those reported for grapefruit, limes and orange juice, and equalling that of lime juice

Match sticks are treated with *ammonium phosphate* to prevent lingering embers after the flame has been blown out

CHEMISTRY

Quick-Molded Plastics

Lenses and prisms were mass-produced during the war for gunsights, range-finders and other optical instruments needed in combat.

➤ QUICK-MOLDED plastics, not laboriously ground and polished glass, supplied the hundreds of thousands of lenses and prisms needed in artillery sights, range-finders, field glasses and other optical instruments used in combat.

For the first time, mass production methods in these optical parts was brought to a sufficiently high point of precision to permit the older, slow-produced glass parts to be shoved almost entirely aside.

The problem of combat optical instruments was seen as acute even before Pearl Harbor World War I had caught the United States with no optical-glass production capacity of its own. This situation was remedied shortly after 1918, but although 1940 found us with plenty of good glass, it was evident even before hostilities started that our national capacity to grind and polish it into lenses and prisms could never meet the insatiable wartime demand

For this reason the National Defense Research Committee set up contracts, principally with Harvard University and the Polaroid Corporation of Cambridge, Mass, to investigate possible moldable plastic materials of optical quality and to design needed new types of instruments Polymers of 113 organic compounds were tested for such qualities as homogeneity, hardness, toughness, clearness—an even dozen points altogether Only two scored high enough to be considered worth adoption· polycyclohexyl methacrylate (CHM for short) and the more familiar styrene Most of the optical parts subsequently molded were made of the CHM polymer

The molds in which the plastic lenses and prisms were to be cast got the careful grinding and polishing that is usually lavished on glass optical parts When the molasses-like plastic mass was poured into them and subsequently hardened, it came out as parts with surfaces already optically perfect, ready to be installed in the instruments without further treatment.

This does not mean that all the troubles of optical instrument makers are over. Easily produced though they are, these plastic lenses and prisms are not the equal of their glass counterparts Their great advantage for war purposes was that they could be mass-produced fast enough to meet the demand, which was away beyond the possibilities of our glass-grinding industry Optical plastics are softer than optical glass, they scratch relatively easily and must therefore either be given glass protective coverings or undergo frequent replacement However, this and other handicaps are being worked on, and it may well be that postwar research will bring notable advances in an entirely new branch of the optical-goods industry

Science News Letter, January 5, 1946

PUBLIC HEALTH

A.M.A. Health Plan Called Inadequate

➤ WHILE SOME members of the American Medical Association undoubtedly are applauding the program for nation-wide voluntary health insurance adopted by the association on Dec. 5, other members remain dissatisfied and critical.

The program is termed a "totally inadequate alternative to President Truman's National Health Insurance plan" by the Physicians Forum in a statement issued by its chairman, Dr Ernst Boas The statement follows

"The Physicians Forum, comprised of doctors who are all members of the American Medical Association, has spent many years of study on the subject and has come to this conclusion· voluntary health insurance is merely an indication of what could be accomplished on a national scale if the President's proposal assuring the health of all Americans is passed by Congress Until their recent reversal, the American Medical Association strongly opposed even this elementary device for medical care.

"Over 40% of the counties in our country have no satisfactory general hospital, which fact in itself makes it impossible for any voluntary health insurance plan to be adequate for the nation. Furthermore, the lower income groups have three times as much sickness as those in the higher brackets but are only able to spend one-third as much on medical attention Since 50% of all the families earn less than $2,000 a year, it is impossible to expect anything approaching the needed medical care under a purely voluntary system where costs are fixed regardless of income

"It is therefore obvious that voluntary health insurance, as now proposed by the American Medical Association, will never be adequate to supply sufficient medical care to all the people The Physicians Forum believes that the proposal made by President Truman for nation-wide social security legislation to finance health insurance in proportion to the ability to pay is the only effective method in accord with the American tradition"

Science News Letter, January 5, 1946

CHEMISTRY

Steps Toward Synthesis Of Penicillin Announced

➤ STEPS TOWARD synthesis of penicillin, anti-germ chemical which a humble green mold makes apparently with ease, are announced by the Committee on Medical Research, Office of Scientific Research and Development, and the British Medical Research Council in London (*Science*, Dec 21).

Efforts of 38 different groups of scientists, 17 in Britain and 21 in the United States, have not yet succeeded in producing a synthetic penicillin, so far as the now published results show

The several known antibiotics of the penicillin class all have the empirical formula $C_9H_{11}O_4SN_2R$ The constitution of the R part of the compound is different in each of the penicillins While the above formula tells the scientists which elements and how much of each are contained in penicillin, the way they are arranged in the penicillin molecule apparently has not yet been determined. This knowledge would be essential to synthetic production of the mold chemical in the laboratory The two structural formulae to which workers in the field now are giving "the most attention" contain respectively a beta-lactam structure and an azlactone grouping

Since penicillin is now obtained on a commercially practical scale from the mold and since its chemical nature is so difficult to determine, it seems unlikely that synthetic penicillin will ever be produced outside of scientific laboratories Efforts to synthesize it, however, will doubtless continue

Science News Letter, January 5, 1946

ENGINEERING

Keep America in Lead

Ordnance, science and industry must continue to work together to keep us prepared as the best assurance against another war.

➤ IT TAKES TIME to develop and manufacture the materiel required by modern war, declared Maj Gen G M Barnes at the meeting of the American Society of Mechanical Engineers in New York "We may not be so fortunate in the future with respect to time as we have been in the past," he commented

"We believe that the best insurance against war is to be prepared," Gen Barnes emphasized "This will require much long-range research and development work, looking to weapons the future may demand These reasons are sufficient to compel all of us to continue the close association of ordnance, science and industry, who have together produced the weapons in this war and who, working together in time of peace, will keep our country always in the lead"

An appropriation of $1,250,000,000 for the Army Ordnance Department, made in 1940, rendered it possible to manufacture weapons for the British, who used our tanks and ammunition to stop the Germans at El Alamein, he said The money made it possible for the Department to release its plans for the industrial mobilization of the country, worked out during the preceding 20 years

It was immediately seen that new and more effective weapons must be developed, he stated It was realized that the task could not be done by Army officers alone "The only hope," he declared, "was to place the program with the scientific and engineering talent of the country, where facilities suitable for this purpose were available This became the policy of the Ordnance Department"

"During the past three and a half years," he explained, "more than 1,000 new items of ordnance were so developed, tested at the Ordnance proving ground, again tested by the combat arm which was to use the weapon, accepted by them, standardized and placed into quantity production"

Science Research Vital

➤ "MANY FUTURE epochal developments in such fields as the harnessing of atomic energy and its employment aboard ship, radar and electronics, supersonic speed, the rocket and the jet for the propulsion of missiles and aircraft, are dependent upon increased emphasis on scientific study and training," declared Rear Admiral Harold G Bowen, USN, at the same meeting

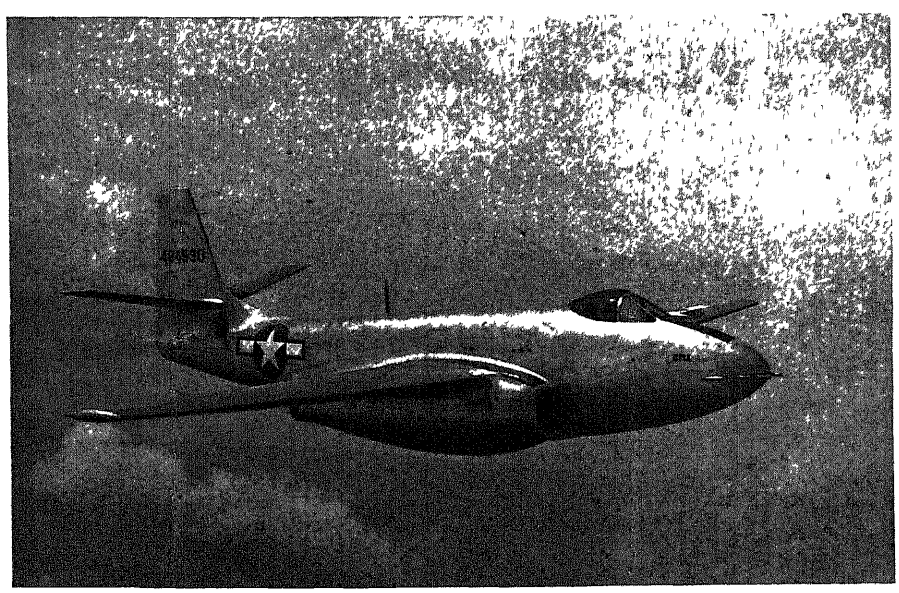
Referring to the alarming deficiencies created by the war in the supply of potential scientists and technical men, the Admiral said that this lack must be made up and the general level of technical knowledge must be raised

"With good men we can expect greater scientific achievements, and therein lies the future of our country," he emphasized.

As one example of scientific progress in the Navy, Admiral Bowen told the hitherto unrevealed story of how the Navy reached the decision to use high-pressure, high-temperature steam. "High pressure, high-temperature is an inadequate expression for this development," he said, "because much more transpired than raising pressure aboard ship to 600 pounds and the temperature of the steam to 850 degrees It represented a complete break with the past. It indicated that engineering in the Navy had arrived at its maturity and had entered an independent existence"

"The introduction of these pressures and temperatures was accompanied by a complete re-engineering job of every ship that the new Navy was building By using turbines of American design, we were able to reduce the number of blades in one instance from 17,000 to 1,700 and produce a much more rugged, reliable turbine Turbine speeds were greatly increased until we reached 10,000 r p m for an idling cruising turbine Entirely new boiler designs were adopted which embodied superheat control, economizers, air casings and a capacity for 40% overload Feed systems with oxygen removers were installed Double reduction gears were required due to the high speed of the turbines and space limitations Emergency Diesel electric generators were adopted The whole electrical system was changed from D.C to A C Flame-proof cable was employed. Steam piping without slip joints made its appearance and alloy steel replaced carbon steel for heavy duty.

"The result of this program was, that by the time of Pearl Harbor, the Navy had completely redesigned, proved at sea and standardized, all of its machinery for both surface ships and submarines."



LONGER RANGE—The newest in turbojet planes, is the XP-83, longest range jet-propelled airplane in the world. Developed by the Bell Aircraft Corporation, it has demonstrated a high speed in excess of 500 miles per hour and possesses aerodynamic characteristics suitable for extreme speeds.

PUBLIC HEALTH

Case Reports Indicate Flu Epidemic Waning

➤ THE INFLUENZA epidemic is waning, it appears from the number of cases reported to the U S Public Health Service From a high of 134,962 cases the week ending Dec 15, the figure dropped to 42,552 the week ending Dec 22, latest for which figures are available

The figures are not strictly comparable, since the one for Dec 22 represents reports from only 43 states and the District of Columbia, but it is believed that when all states have reported, the total will still be considerably below the previous week's More than half of the cases reported Dec. 15 were from one state, Kentucky For that week Kentucky reported 89,363 cases, but only 6,816 for the week ending Dec. 22

If the current epidemic follows the pattern of the 1943-44 one, it will be pretty well over in another week or two Cases that year reached the highest figures the weeks ending Jan 1 and Jan 8 and then declined.

Science News Letter, January 5, 1946

CHEMISTRY

Sorting Machine Isolates Uranium 235 in Vacuum

➤ A SECRET piece of equipment with a meaningless but adequate designation, a "Calutron," is an electrical sorting machine that hurls invisible atoms into a vacuum chamber and groups them according to weight It was used in the isolation of uranium 235, the chain reaction metal used in atomic bombs, it is now revealed.

These pieces of equipment were constructed by the Westinghouse Electric Corporation after their development by University of California scientists and Westinghouse engineers None of the 800 workers who made various parts knew what the completed machine was to be After completion the machines were shipped to the atomic bomb plant at Oak Ridge, Tenn

"The Calutron is able to sort atoms because of atomic weight variances," Dr L W Chubb of Westinghouse explains. "First, uranium is introduced into the machine in volatile form and strikes an arc of electricity, discharged into a vacuum. This breaks it down into atoms and tags each atom with an electrical charge. A magnetic field in the tank causes the ionized uranium atoms to move in circular paths.

"Uranium 235 atoms, being slightly lighter than other atoms of uranium, move in a slightly smaller radius," he continues, "and separate receiver boxes can be placed at appropriate places to catch atoms of each kind"

Science News Letter, January 5, 1946

CHEMISTRY

"Fog Generator" Used for Application of DDT Spray

➤ DDT in the minute droplets of artificial oil fogs promises to be one of the most useful and economical ways of applying this new insect poison for the protection of orchards, vineyards and woodlands It was first tried out during the war with a Navy "fog generator", at that time a secret weapon for the production of a concealing white mist of ultra-fine oil drops. The droplets thus dispersed proved to be even finer than needed, for the fog rose higher than the plants to be sprayed However, the test was successful in leaving microscopically fine crystals of DDT well distributed on the vegetation after the mist had cleared and the deposited oil droplets had evaporated

Now a specially designed "fog sprayer" has been built for agricultural work by the Todd Shipbuilding Corporation, constructors of the original Navy oil-fog machine The new apparatus has a different appearance but works on the same principle Its mist of oil drops clears more quickly than the Navy's oil fog, but distributes the DDT in even more effective fashion

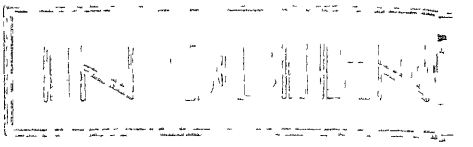
Science News Letter, January 5, 1946

PHYSICS

Vacuum Tube With Built-in Microphone

➤ A VACUUM tube with a microphone diaphragm sealed directly into its side wall is the novel invention on which Jerome Rothstein of Belmar, N J, has received patent 2,389,935. Among possible users for a tube of this type which the inventor lists are detecting minute sound and mechanical vibrations; measuring changes in barometric pressure, temperature, turbulence, altitude, wind pressure and wind velocity; gauging depts of submergence in a liquid and measuring the elastic properties of solids. It is claimed to be especially useful in remote-control and remote-recording setups Patent rights are assigned, royalty-free, to the government.

Science News Letter, January 5, 1946



GENERAL SCIENCE

Fellowships for Science Veterans Still Available

➤ SPECIAL fellowships established by the National Research Council to enable young scientists whose graduate studies were interrupted by the war to resume their work toward the doctorate are still available, but applications must be in by Feb 1

The fellowships were made possible by a grant of $335,000 from the Rockefeller Foundation, to help close up the war-caused gaps in the ranks of American research workers with minimum loss of time Prospective graduate students are urged to get their applications in at once, even though they may not be able to resume their studies until later

Successful applicants will be given $1200 a year for single persons and $1800 for married men, with an additional allowance up to $500 a year for tuition fees Fellowships granted to individuals who are eligible for educational support under the G I. Bill of Rights will be limited to the amounts necessary to give the standard fellowship

Science News Letter, January 5, 1946

ORNITHOLOGY

Two Pairs of Quetzals At Zoo in Washington

➤ TWO PAIRS of quetzals, sacred birds of the ancient Mexican and Central American peoples, have arrived at the National Zoological Park in Washington, D. C, Director William M Mann stated They were brought from Costa Rica, in Central America

The quetzal is a bird about the size of a dove, with brilliant green-gold upper plumage, that shimmers blue when the sun strikes it When fully grown it trails two tail-plumes three feet long. The new specimens are young birds with eight-inch tails

Once widely distributed in the American tropics, the quetzal has been so persecuted by plume hunters that it is extinct over considerable parts of its former range It used to be considered impossible to bring out living specimens, but in recent years this has been successfully accomplished with a few birds.

Science News Letter, January 5, 1946

PHYSICS

"Spurious Echo" in Radar Was Caused by Birds

➤ RADAR pickups of flying birds, often made and correctly interpreted by both British and American observers during the war, were also made by German radar operators, but the Nazis never guessed what caused what they termed *Scheinziele,* or "spurious echoes" A German document on the subject has been turned up by British investigators, and is briefly summarized in the scientific journal, *Nature,* by H. A C McKay of the Admiralty's Miscellaneous Weapon Development Department

The Germans noted that these "spurious echoes" came with especial frequency from the wide mouths of rivers, which of course is just where one might expect to get radar reflections from flocks of geese, ducks and other waterfowl The document as printed gives them the improbably high speed of 600 kilometers (372 miles) an hour; Mr McKay is inclined to regard this as a misprint for 60 kilometers (37.2) miles an hour

How the Nazi radar experts must have groped foggily for an explanation is evidenced by one passage· "The physical origin of spurious echoes is so far unexplained It is probably a matter of sharply bounded layers of discontinuity in the atmosphere Charges, cloud movements, aerial vortices, as well as the boundary region between two layers of air can be suggested as possibilities."

They even planned a program of research, to locate such "discontinuities" in the atmosphere

Science News Letter, January 5, 1946

AERONAUTICS

Pilotless B-17 Bombers Blasted U-Boat Bases

➤ "WAR WEARY" planes, aircraft that were flyable but unfit for combat because of age or condition, were used, pilotless, to destroy German submarine pens on the coast of Europe, it is now revealed Loaded to capacity with dynamite, and directed by radio, radar and television, they hurled themselves at very low-level directly against U-boat bases.

B-17 bombers were used for the purpose Each carried 11 tons of Torpex, a high explosive many times more powerful than TNT They were taken aloft by pilots and co-pilots who at 10,000 feet bailed out over Britain Control of each bomber was then taken over by a "mother" plane, another B-17, whose pilot used radio to guide the giant bomber, radar to keep in touch with it through overcast and to search for unseen obstacles in its path, and television to aid in aiming the "baby" at the target

Approach to the target was usually made at an altitude of 200 to 300 feet, to heighten the blast effect and cut down the accuracy of enemy fighter and flak opposition The "mother" ship generally remained within five miles of its "baby", although it could guide it from a greater distance

Science News Letter, January 5, 1946

CHEMISTRY

Germans Had Superior Air Purification Methods

➤ AIR PURIFICATION devices developed in Germany for use in submarines, especially in the one- and two-man U-boats, appear to be well ahead of Western Allied developments, according to American official investigators who visited Germany under the sponsorship of the United States government

Development work by the Draegerwerk (Draeger factory), at Luebeck was investigated particularly, and especially work on air purification devices for underwater craft and for high-altitude demand regulators An official report has been prepared, copies of which may be obtained from the Office of the Publication Board, U S. Department of Commerce

The Draegerwerk, well known for its production of precision instruments, was concerned with high-altitude oxygen breathing apparatus, submarine escape apparatus; diving apparatus; gas masks, oxygen cutting and welding apparatus, mine safety devices, swimming vests for pilots, rubber, surgical and technical goods, and other essential products The report discusses them all

Air purification devices for one- and two-man U-boats are important items A less bulky system is required than ordinary equipment incorporating a fan and motor This is particularly true in craft designed on the torpedo principle. The system developed at this plant was later used in German midget submarines

Science News Letter, January 5, 1946

METEOROLOGY

Light, Powerful Magnet Made from Iron Oxide Ore

➤ A NEW TYPE of small, light, but powerful magnet made of iron rust and cobalt oxide has been developed by the General Electric Company, it is now revealed. It has been used in highly sensitive aircraft meters and in other wartime devices, and now will be available for general civilian uses It is claimed to be the lightest magnet ever developed

Actually, it is not made with the familiar rust seen on unprotected iron implements, but from an iron oxide ore in which the oxide is chemically the same as iron rust The iron oxide and the cobalt oxide, both in powder form, are mixed in the proper proportion and formed into a solid by the process known as powder metallurgy. This means that the mixed powders are placed in a mold and sintered, that is, heat treated at a temperature well below fusion point

The new type of magnet is a nonconductor of electricity and is not easily demagnetized It thus may be used in high-frequency magnetic fields with little eddy current loss, it is claimed

Science News Letter, January 5, 1946

CHEMISTRY

Non-Petroleum Motor Oil Flows in Zero Weather

➤ A NON-PETROLEUM war-tested motor oil for automobiles and aircraft engines will be on the market in limited areas this winter The new product flows freely at 30 degrees below zero Fahrenheit, does not thin out at high temperatures, and provides efficient lubrication of the moving parts when the engine is running, it is claimed.

This engine lubricant will be known as Prestone motor oil It is produced by Carbide and Carbon Chemicals Corporation, a unit of Union Carbide and Carbon Corporation It was developed by research chemists of the producer, the research beginning in the early 1930's It is a chemically created oil that resembles ordinary motor oil

The new product will clean motors which have been gummed and sludged by ordinary oils, it is claimed. It is wax-free It is characterized by low change of viscosity with changes of temperature, and can be used the year around without change of grade. However, excessive gasoline dilution and accumulation of dirt make oil change necessary.

Science News Letter, January 5, 1946

GENERAL SCIENCE

Science Previews

1946 will bring enlarged and accelerated resumption of pure and applied research and announcements of steps toward conquest of important diseases.

By WATSON DAVIS

➤ THE YEAR 1946 will be crucial for science and technology applied to a world at peace There will be announcements, as there have been in several instances in past years, of significant steps toward the conquest of important diseases or introduction of new techniques of industrial importance.

Even more important in the long view will be the accelerated and enlarged resumption of pure and applied research in many fields neglected during the war when all the energies of scientists and engineers were devoted to war

The release of atomic energy and the many problems that it has presented to a startled and fearful world will during 1946 continue to be a matter of major concern How successfully this situation is handled from an international standpoint will largely determine whether the world will have another war in 10 to 25 years

Fundamental Research

A National Research Foundation that will give fundamental research in physics, chemistry, biology, medicine, psychology and other fields the moral and financial support of the people through Congressional enactment will in all probability be established early in the year This will make possible in universities, laboratories and other institutions the sort of earnest and hard-hitting research that directed at war has brought such significant results Only the short-sightedness of factions of scientists if they continue to insist upon a certain kind of administrative set-up for the government support will seriously delay this most important step in science's reconversion

During 1946 there will be the first applications of atomic energy for industrial power if the legal and policy difficulties of releasing atomic energy for such use are solved

The immense amounts of radioactive materials produced as a by-product of the manufacture of plutonium, one of the atomic elements, will present new possibilities of treating cancer and other diseases, and there will also be ample amounts of radioactive tracer elements to use in the exploration of the nature and origin of many other diseases and physiological processes

The world systems of air transport for passengers and materials built during the war will go into peacetime service and the interchange of peoples between previously remote portions of the world will be accelerated Air passenger service will benefit from the development of bombers and transport planes that was accelerated by the war and many new or reconditioned planes of large capacity will become available

Further steps in the development of jet and rocket propulsion for aircraft will be taken in research laboratories, with the consequence that many of the most advanced types of fighters and bombers used in the war will begin to become obsolete

Upon drawing boards and in experimental models there will be the beginnings of commercial as well as military craft that will fly faster than the speed of sound at high altitudes

From the electronics of the war will come more techniques for the use of automatic machinery in factory and home Very small radio tubes such as used in the proximity fuze make possible radio sets of small size which may be commercially available about the middle of the year Military walkie-talkie experience will be applied to a citizen's radio service which uses short-range portable radio combined transmitters and receivers to keep moving vehicles and boats and remote locations in communication with other such apparatus or linked into regular telephone lines

The radio location network, known as loran, that allows ships and planes to determine position by receiving special timed radio impulses, will be continued after its war installation to guide peace-time traffic Although less useful in peace, radar will be used as an anti-collision device.

Prediction of radio transmission conditions, dependent upon solar phenomena and earth atmospheric conditions, will allow practical forecasts several months in advance

From intensive research now in progress, expect some important developments in our understanding of cancer List also on the medical timetable of the future the possibility of better chemical treatments of tuberculosis as the result of some of the new drugs under development

Streptomycin, the newer antibiotic, is likely to come into larger commercial production for use on kinds of infections that are not effectively treated by the sulfa drugs and penicillin

Further Disease Study

One great class of disease causes, the viruses, have as yet not been checked by chemotherapeutic agents and among the many new drugs being explored there is the hope that during 1946 one that has promise of virus disease control in human beings will be found.

Medical care and the promotion of health among the people is a major unsolved problem, made more difficult by the vested interest attitude of the medical profession and their opposition to any plan for paying for preventive and curative medicine by the social security method During the year a practical method of giving better medical service to all, with government supervision, may be enacted by Congress

Colleges Will Be Filled

The colleges and universities of the nation will be filled to overflowing with veterans and war workers who are returning to get science and technology training needed so urgently by our industries and laboratories The proved fruitfulness of science will attract to scientific studies even larger numbers of college students

The matter of universal military training may not be resolved until Congress and the nation as a whole has had a chance to integrate the military preparedness of the country with the necessary peace-time education and training which, because of the whole-people aspects of any future war, becomes as important as conventional military training

With the return to civilian life of psychologists and psychiatrists and the

release of formerly classified information, we may expect new developments useful to industry and public mental health

Industrial machines as well as automobiles and airplanes will be designed so as to be more suited to the men and women that operate them This will result in a lessening of fatigue and nervous irritation

There may be a widespread tendency to train foremen and supervisors by newly developed techniques to consider the human needs of their employees in placing them so as to make best use of their abilities, in arranging working groups in such a way as to avoid frictions, in encouraging participation in planning of work and in arranging working conditions so as to avoid unnecessary nervous strains

New sciences for the study of the psychology and mental illnesses and discords of nations, groups and social classes may be born

The connection between ordinary fatigue, nervous exhaustion, and mental illness will be explored and may result in finding some chemical factor in mental breakdown This may point the way toward a new treatment

Exploratory expeditions in all fields will begin to take the field again The large amounts of scattered real estate that we have had to take over, especially in the Pacific, will be a challenge and an opportunity to field scientists all the way through the alphabet, from anthropology to zoology

More Soilless Gardens

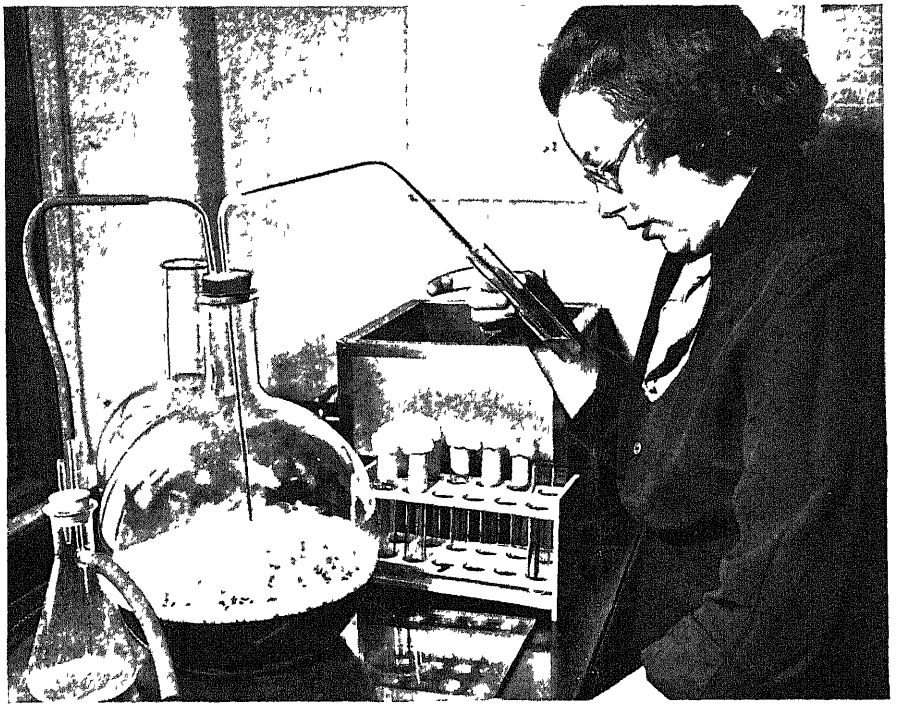
Further installations of soilless gardens will be made on desert islands, where Americans will have to be stationed to take care of military and civil airfields

Pesticides (DDT, ANTU, 1080, 2-4-D, etc) will come into general use, as manufacturing facilities are released from military demands Much more research will have to be done on these (1) to learn their most effective use, (2) to find their limitations, (3) to discover thresholds of safety for contact with human beings, domestic animals, wildlife, harmless or beneficial insects

New insect pests and plant diseases may break through our quarantine barriers, due to increased air travel Greater vigilance will be necessary to try to prevent this, ruthless and costly extermination campaigns must be carried out if a major pest does get in

Air transportation may begin to bring in some of the tropical fruits and other products our men had a chance to get acquainted with overseas, like mangosteen, cherimoya, etc Here again, vigilance against pests and diseases will be needed

There will be at least a beginning of restored trade in war-scarce tropical commodities, especially rubber, drugs (especially quinine), and spices (especially black pepper); overseas sources of other goods, such as Manila hemp, Chinese tea, tung oil, also from China, copra and all the palm oils, camphor from Formosa will be making their bid for restoration of normal markets Bulk tropical commodities like sugar will return as shipping becomes available.



MEDICINE ADVANCES—The public will benefit greatly from medical research in the future. This scene in the Naval Medical Research Laboratory at Bethesda was selected to typify the activities expected to continue in Navy, Army and civilian medical research institutions.

Restoration Aid

Restoration of European agriculture and livestock industry will be helped by shipments of seed and breeding stock from U S A and other war-spared lands

Using its developments and production for war, industry should during 1946 bring forth many new devices, machines, products and processes Plants devoted to airplane manufacture can be expected to give birth to new kinds of assembled houses and new makes of automobiles Television farther advanced and seeing more effectively in near-darknesses may be announced and put into use

Better and more easily developed color photography will be released for amateur and professional use, while important developments in removing much of the personal element from printing three- and four-color photographic processes may be announced

Even the atom bomb will have its effect on industry even if atomic energy is not used industrially or bombs do not wipe out civilizations The advances made in technical methods during the atom bomb development have made available thousands of improvements to industry

Science News Letter, January 5, 1946

An adult has in his body about 1.4 pounds of *phosphorus* which must be constantly replenished by means of foods consumed

When using *luminous paint,* new brushes are recommended because it is difficult to clean used brushes from traces of old paint that might be detrimental to the luminous material

Do You Know?

The United States produces about 97% of the world's supply of *grapefruit*

Vanillin, an essential flavor and perfume substance, occurs in vanilla beans to the extent of two or three per cent

On the flanks of the *shrew* is a gland that secretes a substance with a pungent odor that may save it from some of its enemies

Chinese doctors have prescribed *seaweed* for centuries in treating goiter though knowing nothing whatever about its iodine content

The absence of the pink *bollworm* from the United States has enabled this country to compete with the other cotton producing countries in spite of our higher labor costs.

The science of *metallography,* which deals with the internal structure of physical constitution of metals, began to develop a half-century ago, now it is an indispensable standby of the steel technologist

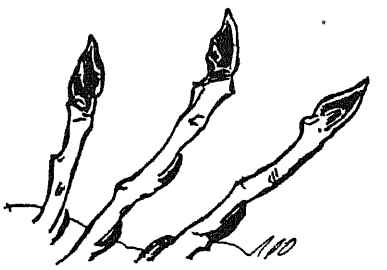
"Super fuels," added to low-octane gasoline to raise the octane rating, are produced mainly by compressing certain abundant petroleum refinery gases to liquids and combining the liquids in the presence of hydrogen fluoride

Products of red and brown *seaweeds,* such as agar, algin, and carrageenin, should have "phycocolloid" as a group name, the Scripps Institution of Oceanography suggests, seaweed gums and mucilages are unsatisfactory names, it says.

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ECOLOGY

NATURE RAMBLINGS by Frank Thone



Winter Drought

➤ DROUGHT is something we usually think of in connection with late summer's burning sun, hot winds and baked soil In winter, when annual plants are all dead and most of the woody perennials leafless, there doesn't seem to be much chance for vegetation to droop and wither for lack of moisture Besides, it isn't hot enough to evaporate water rapidly

Nevertheless plants, even in winter condition, can suffer from loss of water Winter often brings really severe drought, despite low temperatures Temperature is only one of the factors that produces evaporation Another rather important factor is air movement that blows water vapor away as it comes off the evaporating surface, and no one can deny that there are winds in winter Moreover, they are often very drying winds Even during a blizzard, when the air is filled with snow, the relative humidity may be away down These conditions are especially liable to obtain in the West, where people talk of the "dry" cold

Still, supposing midwinter atmospheric conditions do favor evaporation, how should that affect plants? They are close-reefed, and frozen solid besides A lump of ice can't evaporate!

But right there's the rub. It can Water vapor can come out of ice just as it can out of liquid water, even if not so rapidly. In the strictly technical sense of the term it is not evaporation Physicists have a special name for this change from the solid to the vapor state without the intervention of a liquid phase they call it sublimation But no matter what the process is called, the stock of water in a winter-bound plant can be depleted by loss as vapor. And since roots can't suck any water out of the ice in the soil, replenishments are impossible

Of course, the water in the woody stems of a tree or shrub in winter isn't really ice It has sugars dissolved in it, and other things that make it more or less like mucilage, and everybody knows that sugar syrup or mucilage do not freeze as readily as pure water (Indeed, if ice crystals form in the tissues of a plant it is a very bad thing for the plant) But to return to our story of evaporation water can disappear as vapor from even the carbohydrate-thickened sap, and the plant will feel the effects of drought, no less than if it were losing water to a hot summer sun.

Science News Letter, January 5, 1946

PSYCHOLOGY

Expensive Perfume Is Not Preferred to Cheap Kind

➤ IF YOU gave your girl friend perfume for Christmas and couldn't afford the most expensive brand, she may be just as well satisfied with a cheaper kind

Sixty-nine students at the University of California sniffed six different perfumes in a test to see whether the kind costing $16 an ounce was any better liked than another costing only 50 cents

Results of the test are reported by Dr Gladys M Jewett, in the *Journal of General Psychology* In the case of lilac perfume, only slightly more than half preferred the $16 brand (56%). With the gardenia, 55% preferred the fifty-cent kind to an $8 variety With apple blossom, there were a few more votes for the expensive kind—69%

There is no consistent relation, Dr Jewett decided, between the price of the perfume and the preference of the lady The lady, however, did not know the prices of the perfumes she tested. There was no difference in lasting quality within an eight-hour period.

Unfortunately, it was not possible to compare the judgments of the girl students with those of men, due to the exodus of men from the University for service

Science News Letter, January 5, 1946

Fiberglas bandages are used for fractures and similar injuries to the human body; fiberglas-plastic cast weighs about one-fifth as much as a plaster cast and does not block X-ray penetration.

AERONAUTICS

America's Fastest Plane

The Army's P-80 Shooting Star was made possible by two revolutionary types of jet engines. Engines are designated as the 1-16 and the 1-40.

➤ TWO revolutionary types of jet engines made possible America's fastest plane, the Army P-80 Shooting Star, headquarters of the Air Technical Service Command at Wright Field has revealed The engines are designated as the I-16 and the I-40.

The I-16, created by General Electric Company and Army engineers, was used in the P-59 trainer in which jet pilots were trained From it was developed the more powerful I-40, sometimes called the super G-E jet

The basic principle of the two engines is the same The chief difference lies in an improved line of gas-flow through the main turbine

In both engines, air is drawn through an intake duct in the front and forced into the combustion chamber by means of a centrifugal compressor This is simply a high-speed fan

Kerosene is used for fuel It is injected into the combustion chamber where it is atomized, mixed with air, and burned Continuous combustion of the kerosene occurs at approximately a constant high pressure, resulting in a stream of high-velocity gas which is released through the rear nozzle, thus driving the plane forward The turbine, a fan-like wheel, is activated by this stream of gas and provides power for the compressor

In the I-16 the course of the stream of gas is reversed twice in this process, while in the I-40 the flow is direct, resulting in less loss of power This is the main difference Both engines are developments from the British jet engine invented by Air Commodore Frank Whittle.

Rigid flight tests of the I-40 jet engine are now being made by the General Electric Company, with the engines installed in converted B-24 Liberators This was revealed by N F Frischhertz, one of the company's engineers, at the recent New York meeting of the American Society of Mechanical Engineers This is for the future development and testing of the jet engine under actual flying conditions.

The converted Liberators are called "flying laboratories" and are used because they provide a great number of facilities and advantages of a ground test cell, or wind tunnel, at considerably less cost and with greater availability. Their use also allows flight space for design engineers to observe operation under flight conditions

At the same meeting of mechanical engineers, Dr William F Durand, formerly chairman of engineering and industrial research, National Research Council, declared that future development of jet propulsion demands continuing detailed research into design and construction, both in the jet engine and the plane on which it is to be used The jet engine "will undoubtedly occupy a highly important place in the field of aircraft propulsion," he said

Science News Letter, January 5, 1946

AERONAUTICS

Improved Methods Needed For Airplane Traffic

➤ AIRLINERS are now spanning oceans and continents with a volume of traffic which creates serious hazard situations calling for vastly improved methods for handling arrivals and departures at established terminals, engineers were told at the Chicago meeting of the Society of Automotive Engineers International air traffic, they were informed, already has reached proportions that make airways control and air navigation problems of the first magnitude, demanding prompt solution

Navigation aids for long-range flights, developing far beyond those available to other transportation media, were said to contribute to the efficiency of aviation operation, with war-developed electronic and radar devices widely applicable. Contrast was drawn between the ease and safety en route over the ocean, and the delays, difficulties and dangers created by congestion at the air terminals

The development of a comprehensive system of air navigation, control and communications was proposed by Capt S P Saint of American Airlines. It should include, he said, every known principle of safety engineering He asserted that such a system would provide flexibility of movement for all planes, have no limitations other than air space, and would automatically coordinate air traffic and maintain separations

Self-checking communication devices, he continued, would establish continuous two-way channels between each airplane and the automatic control system and handle all routine clearance, thus freeing normal voice communication for special services He proposed to aid navigation by using self-checking radar ground beacons affording all pilots precise holding patterns, but permitting ground control to change routings when necessary

Air-conditioning airplanes by the installation of air turbine refrigeration was described by Bernard L Messinger of the Lockheed Aircraft Corporation The advantages of this system, he said, are simplicity, lightness, compactness, and a highly effective use of air as a refrigerant

Vapor-compression cycle refrigeration, generally used commercially on the ground, was reported to be unsatisfactory for aircraft, he stated, because of mechanical complications, excessive

ACCURATE INSTRUMENTS FOR PRECISION TIMING

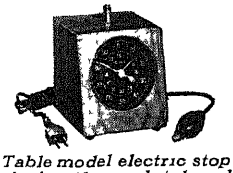


Table model electric stop clock with a-c clutch and toggle switch

The Stoelting table model electric stop clock is an accurate timer for a wide variety of industrial and laboratory tests such as measuring start-to-stop intervals of relays and instruments, and for checking sequence operations

Timer with a-c clutch has toggle switch for manually starting the pointer Timer with d-c clutch has binding posts only for attaching d-c control circuit for starting and stopping the pointer Both timers have a-c clock motors, and pointers are reset with knob

The Stoelting electric timer and impulse counter is an accurate, dual-purpose instrument for counting individual electric impulses or for use as a chronoscope

When used as timer, 11-16 v current is taken from step-down transformer When used as counter, direct current only is used Counter capacity — 7,200 impulses



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weight, heavy power requirements, and relatively low efficiency

Mr Messinger characterized as a "popular misconception" the belief of some engineers that aircraft air conditioning does not require refrigeration because planes fly at high altitudes Passengers and mechanical equipment, he said, tend to make cabin interiors warmer than might be expected

Science News Letter, January 5, 1946

African bongo are called the handsomest of all the antelopes.

Improved soap is possible with the use of molecularly dehydrated phosphates, it is claimed by chemists who state that such soaps will have nearly twice the cleansing power of ordinary pure soap

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Books of the Week

THE CHEMICAL PROCESS INDUSTRIES—R. Norris Shreve—*McGraw*, 957 p, illus and charts, $7 50 A textbook for engineers

A FUTURE FOR PREVENTIVE MEDICINE—Edward J Stieglitz—*The Commonwealth Fund*, 77 p, charts, $1 A program for the development of preventive medicine, defined as "the attainment by the individual of optimal development and performance"

MEN WITHOUT GUNS—DeWitt Mackenzie—*Blakiston*, 152 p, illus, $5 A record of the work of the Army Medical Corps, in 177 drawings and 118 full color plates by famous contemporary artists Foreword by Maj Gen. Norman T Kirk, Surgeon General, U S Army.

MY GARDEN DAY-BY-DAY 1946—*Tool Shed*, $1 A week of gardening advice and verses to each large page of this calendar, with room for notes

SCIENCE AND SCIENTISTS IN THE NETHERLANDS INDIES—Pieter Honig and Frans Verdoorn, Eds—*Board for the Netherlands Indies (Stechert)*, 491 p, illus and charts, $4 00 Technical articles dealing with the development of various branches of science in the Netherlands Indies Although prepared by the Government of the Netherlands Indies, "the editors have attempted to keep the work free of narrow political considerations"

STORMS, FLOODS AND SUNSHINE A Book of Memoirs—Isaac Monroe Cline—*Pelican*, 290 p, photographs, charts, $3 Experiences of a meteorologist who spent over 50 years in the service of the U S Weather Bureau Bibliography is included

THE WHEATS OF CLASSICAL ANTIQUITY—Naum Jasny—*Johns Hopkins Press*, 176 p., illus, $1 75 The Johns Hopkins University Studies in Historical and Political Science, Series LXII, No 3

Science News Letter, January 5, 1946

ENGINEERING

Glass-Reinforced Plastic

➤ FINE GLASS fibers used to reinforce plastics, much as steel rods are used to reinforce concrete, make a plastic material with greater strength than the structural metals, H W Collins of Owens-Corning Fiberglas Corporation stated at a meeting of the American Institute of Chemical Engineers in Chicago The war-developed material, widely used in military aircraft, will have many peacetime applications

The glass-reinforced plastic material does not corrode and is dimensionally stable, he declared, and can be fabricated without costly dies The plastics industry now has a material that can be thought of in terms of the metals and their uses, he added It is possible that the glass-reinforced plastic may be used "for such products as railroad car, bus, automobile and truck body parts, for boats and canoes, for luggage and furniture, for piping, for kitchen and bathroom assemblies, and home appliances"

Because the low-pressure resins used in combination with the glass fibers polymerize without giving off volatiles, he explained, it is possible to cure them in any shape merely by holding them in contact with the mold This makes it possible for manufacturers to produce very large parts, such as the whole top of a Pullman car or the hull of a boat, without the expense and physical limitations imposed by the use of high-pressure presses.

Strength properties attainable with glass-reinforced plastics are, according to Mr Collins· tension, 76,000 pounds per square inch, compression, 68,000 pounds per square inch, and flexure, 112,000 pounds per square inch

Science News Letter, January 5, 1946

RADIO

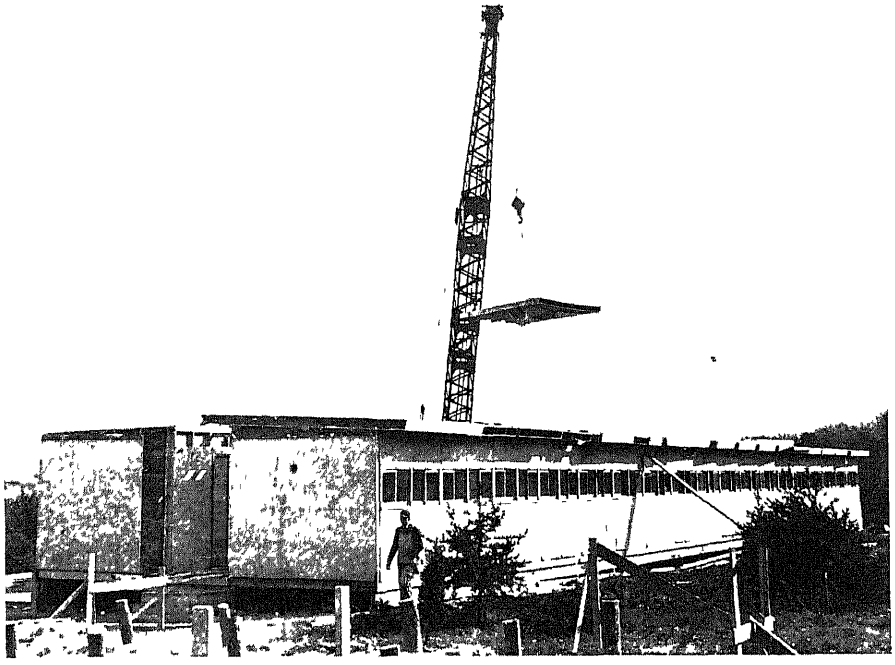
Engineer on Moving Train Talks to Yardmaster

➤ FIRST TRYOUT of ultra-high-frequency radio communication between moving railroad engines and control towers was made at the Wayne Junction yard of the Reading railroad, near Philadelphia Two-way conversations were successfully conducted between the yardmaster's office and three diesel-electric locomotives moving about the yard The principal advantage of using very high frequency waves is that they are basically static-free

The center of the system is a 25-watt transmitter in the yardmaster's office The locomotives are equipped with 15-watt transmitters Tests are scheduled to continue for about three months They are under the direction of Nelson Wells of Maguire Industries, Inc., who devised the equipment and supervised its installation

Science News Letter, January 5, 1946

A new *tobacco*, low in nicotine and as aromatic as expensive Turkish products, has been developed by the University of Kentucky.



FOR VETERANS—Power crane swings roof section into place as one-story war dormitory nears completion at Federal Public Housing Authority's "War Housing Re-Use Demonstration." One section of building is being converted into family dwelling unit for temporary housing for veterans.

ENGINEERING

War Houses Converted

Units can be cut, moved and converted into dwellings for families. Demonstration will be held January 12 through February 9.

➤ HOW HOUSING units built for temporary dormitories and Army barracks can be cut, moved and converted into dwelling units for families will be shown at Silver Spring, Md, in a public demonstration that opens Jan 12, and continues through Feb 9

The demonstration is particularly for state, county and city officials from various sections of the United States where such emergency housing is now available for re-use The techniques to be shown are those found satisfactory by tests and used to meet shifting war housing needs and are now employed to meet the veterans' housing problem.

"The immediate purpose of the demonstration is to show how all possible types of war housing structures, including dormitories and barracks, may be reconstructed to provide dwelling units for veterans and their families," the Federal Public Housing Authority states. This government agency will conduct the demonstration

Experiments in demolition for reassembly of war housing, which had not been intended as demountable, were conducted at several sites by the government office The structures were of wood or frame and composition construction The experiments showed that they could be cut into panels and moved readily and successfully They determined practical methods of panelizing walls and roofs with a minimum loss of materials

During the war some 10,000 units were moved, following the techniques developed, with some of the moves ranging up to 1,100 miles Since V-J day, more than 5,000 units have been moved, or scheduled for moving, to provide emergency housing for returning veterans.

Science News Letter, January 5, 1946

MEDICINE

Spider Bite Cure May Come from Drug

➤ A DRUG that may turn out to be a cure for poisonous black widow spider bite has apparently been found The drug is the synthetic chemical, neostigmine methyl sulfate, sometimes also called prostigmine

"Dramatic and complete relief of muscle spasm and pain" came within one hour after a single dose of this chemical in a case reported by Dr James E Bell, Jr, intern at Roper Hospital, Charleston, S C, and Dr John A Boone, assistant professor of medicine at the Medical College of the State of South Carolina (*Journal, American Medical Association,* Dec 8)

The patient had previously suffered for five and one-half hours although the usual treatment for black widow spider bite, calcium gluconate and sedatives, had been given

The idea of trying neostigmine occurred to Dr Bell because this chemical is reported to have given good results in treatment of muscle spasm in infantile paralysis and rheumatoid arthritis Muscle spasm, particularly of the abdomen but also affecting arms and legs, is the most prominent physical finding in black widow spider bite poisoning

One recovery, the Charleston physicians point out, does not constitute proof that the treatment is a cure, but since black widow spider bites are infrequent in Charleston, they are reporting their experience for other physicians who may be called on to treat this bite oftener

Science News Letter, January 5, 1946

YOUR HAIR and Its Care

By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT!
If you want healthy hair, lovely hair, then you need the expert advice in this book
Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as
Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc, etc
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New Machines and Gadgets

⚙ *DIRECT READING spectrometer measures electronically the concentration of elements in alloys and automatically records the results. This electronic method of measuring the intensity of spectrum lines eliminates the necessity for photographic and developing equipment and an expensive microphotometer.*

Science News Letter, January 5, 1946

⚙ *POWERFUL ELECTRO MAGNET, with a maximum 4,000-pound attraction between its poles spaced one-half inch apart, has two coils of copper wire wound 6,400 times around an iron core. The enormous heat generated by the current is carried off by circulating 15 gallons of oil a minute through the coils.*

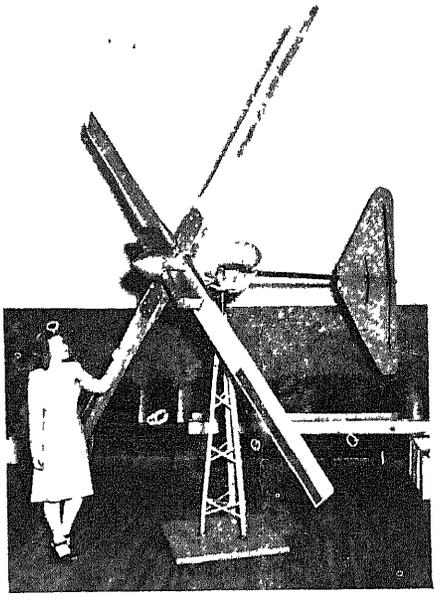
Science News Letter, January 5, 1946

⚙ *MODULATOR glow tube of the crater type, a cold cathode recorder tube that is rugged and dependable for facsimile and sound-on-film recording, is operated by the single-ended output stage of a push-pull amplifier. It provides a modulated, high-intensity point-of-light source.*

Science News Letter, January 5, 1946

⚙ *STIRRER-TYPE superpressure apparatus for laboratory use operates at pressures up to 10,000 pounds per square inch and at temperatures up to 750 degrees Fahrenheit. It is available in various sizes. It is heated by an electric jacket, and its stirrer is operated by a variable-speed motor.*

Science News Letter, January 5, 1946



⚙ *WIND-DRIVEN electric generator for 32-volt farm lighting system will charge storage batteries in winds as low as five miles an hour. When high winds are blowing an automatic governor turns to an ineffective angle two of the four blades shown in the picture, to prevent over-charging.*

Science News Letter, January 5, 1946

⚙ *ROTARY-DRILL bit bores holes in the earth for mine shafts six feet in diameter. It can be used where the earth is composed of loose and water-saturated sand and clay. The rig is similar to that used in oil fields, including a derrick and huge drill.*

Science News Letter, January 5, 1946

⚙ *EXTENSION for half-inch electric motor shafts, called an arbor by mechanics, makes it possible to use a grinding wheel on the main shaft, and rag or wire wheels, or circular saws, on the arbor. The arbor fits well over and onto the main motor shaft.*

Science News Letter, January 5, 1946

⚙ *SLIDE MOUNT for photographers' use holds a photographic slide firmly in place and permits its removal without tearing the mount. No glue, hot iron or water is required to hold the slide in position. The mount, in which the film is inserted, can be used over and over again.*

Science News Letter, January 5, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 292.*

Question Box

AERONAUTICS

Why are improved methods needed for airplane traffic? p. 13

CHEMISTRY

How do glass fibers help plastics? p. 14

What is the danger of spraying pastures with DDT? p. 5

What new hydrogen peroxide process has been revealed? p. 5

What steps toward the synthesis of penicillin have been announced? p. 6

What synthetic fibers did Germany produce? p. 4

ENGINEERING

How can an engineer on a moving train talk to the yardmaster? p. 14.

What is the best assurance against another war? p. 7

GEOLOGY

What caused Arizona's famous crater? p. 2

Where have fossil skeletons of giant buffalo been found? p. 3

MEDICINE

What drug may prove to be a cure for the bite of the black widow spider? p. 15

ORNITHOLOGY

What are quetzals? p. 8

PHYSICS

What caused the "spurious echo" in radar? p. 9.

SAFETY

What is the probable cause of the Kentucky mine disaster? p. 2

Where published sources are used they are cited.

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 12, 1946



Germ Warriors

See Page 18

A SCIENCE SERVICE PUBLICATION

BIOLOGY-MEDICINE

Disease Warfare Not New

Disease has played a decisive part in many wars, though "germs" have not been used as intentional weapons on any considerable scale.

➤ THE IDEA of the use of biologic or bacterial agents in warfare is not new Major use of "germs" as intentional weapons of war has not yet occurred on any considerable scale, yet disease has played a decisive part in many wars.

Up until the 20th century epidemic disease during war has always produced more military casualties than the missiles of the enemy

The use of organisms that cause communicable diseases as an instrument of warfare was considered by the Conference on the Limitation of Armaments held in Washington in 1922 A commission that numbered among its members the American physiologist, Dr Walter B Cannon, who died only a few months ago, reported to the League of Nations that the effects of bacterial injury cannot be limited or localized, modern water purification methods protect against the organisms of typhoid and cholera, plague is a disease that would be as dangerous for the force using the organisms as for the attacked, danger from typhoid has been exaggerated, and modern sanitary methods are effective in controlling communicable diseases

Doubtless with the biological warfare researches announced by the War Department, such conclusions are outdated Bigger and better diseases have been found, no doubt, and counter measures developed

Opinion in the era between the two World Wars was that bacterial warfare, like gas warfare, would not be a very effective weapon There were "practically insurmountable technical difficulties" Perhaps with the new researches this is no longer true, and the mere fact that biological warfare was not used in actual combat may be no indication that it could not be used with effect.

Bacterial warfare was on the hush-hush list of the U. S censorship codes of World War II and there were only a few breaks or mentions of the subject

An article that was originally published in the Military Surgeon for March, 1933, written by the then Maj. Leon A Fox, MC., U. S. Army, who is now a general, was reprinted by that journal and several other medical, scientific or technical journals in 1942 and 1943, just when the secret biological warfare researches were getting well under way This caused a flurry of germ warfare publicity, which gave military and censorship authorities some unhappy moments

Surgeon General Thomas Parran of the U S Public Health Service, at the Conference of Mayors in 1942, warned that, in his opinion, the enemy had planned and would use bacteriological warfare wherever possible

A book titled "Japan's Secret Weapon," written by Barclay Newman and published in 1944 by Current Publishing Company, New York, called disease warfare Japan's "new jiu-jitsu in the death grapple of nations." It had among chapter headings· Spirochete warfare, black fever or kala-azar, tsutsugamushi fever, black death or Ohara's disease, leprosy as a weapon, fungus warfare, Japanese encephalitis, cancer-causing chemicals, miyagawa cocktail, amok, "American sleeping sickness".

The Japanese were charged in June, 1942, by Dr P Z. King, director of the Chinese National Health Administration, with using Chinese people as guinea pigs to test the effectiveness of bacteriological warfare Other news reports from time to time charged use of germs in war against China to the Japanese.

The next war will be waged with disease germs and their toxins, weapons more devastating than atomic bombs and easier to develop, Maj Gen. G B Chisholm, deputy minister of National Health and Welfare of Canada, and director general of medical services of the Canadian Army, warned in an address prepared for delivery on Oct. 23 of last year before the William Alanson White Psychiatric Foundation at Washington This portion of the address was not actually delivered

Gen Chisholm said:

"While the atomic bomb has been a dramatic weapon in the closing phases of the recent war other almost completely developed weapons are still more terrible

"What of an invasion of a country by a few thousand immunized tourists loaded with anthrax or the toxin of botulinus or typhoid or influenza or perhaps some new bacteria or filterable virus especially developed for the purpose, or the spreading of such materials by planes without warning?"

"Any country could be paralyzed and destroyed at leisure by a well-organized attack of this type—and without any development of heavy industries

"Let us all be prepared not for the last war with navies and armies and airforces, but for the next war with rockets and atomic bombs and bacteria and toxins

"These are the weapons of the future and with them the whole world can be reached from any place on the earth in a few minutes

"The people who definitely do not want to fight any more wars must promise total annihilation to any nation which starts to fight and must be prepared immediately and ruthlessly to carry out that promise without parley or negotiation. This involves the continual upkeep of widely dispersed atomic rocket stations covering the whole world and a continual high pressure research program to discover ever more efficient methods of killing to keep ahead of any possible competition.

"This must go on until we, all the people, are re-educated to be able to live in peace together, until we are free to think and behave sensibly"

Science News Letter, January 12, 1946

BIOLOGY-MEDICINE

Biological Warfare Technical Advisers Named

See Front Cover

➤ THE PICTURE on the front cover of this SCIENCE NEWS LETTER shows a group of biological warfare technical advisers (left to right) Dr Ira L Baldwin, present Dean of University of Wisconsin, Capt N S Prime, USN, Commanding Officer of Naval detachment at Camp Detrick, Md, and also Chief of Ordnance for Biological Warfare development, Brig. Gen. W. A Borden, USA, Chief of New Developments Division, War Department Special Staff. Mr. George Merck (President of Merck Chemical Co), Special Consultant to the Secretary of War on Biological Warfare; Rear Admiral Julius Furer, USN; Commander W B Sarles (Asst. to President, U of Wisconsin), Technical Adviser on Biological Warfare; Col. Oram Woolpert, (Professor, Ohio State U) CWS technical adviser on Biological Warfare, and Lt. Col Norman Pyle, CWS Technical Adviser on Biological Warfare.

Science News Letter, January 12, 1946

BIOLOGY-MEDICINE

Biological Warfare

Preparations made by U. S. in top secret research. Japanese also developed germs for offense, but disease weapons were not used in World War II.

By WATSON DAVIS

➤ ADD GERMS to the atomic bomb, rockets and other new weapons that can be expected to be used in any future wars

The War Department released a report on America's extensive preparations to combat and undertake biological warfare These researches undertaken by nearly 4,000 scientists, Army and Navy personnel, in four war laboratories in Maryland, Mississippi, Utah and Indiana, were "top secret" even after V-J day until the announcement

Biological warfare was not used by the United States While intelligence reports after the Japanese occupation showed that the Japanese army fostered offensive developments in this kind of warfare from 1936 into 1945, the report states there is no evidence that the enemy ever resorted to this means of warfare.

The biological warfare report, made to the Secretary of War by George W Merck, special consultant for biological warfare, is notable in not mentioning any specific disease by name

But it does define biological warfare as "the use of bacteria, fungi, viruses, rickettsiae and toxic agents from living organisms to produce death or disease in men, animals, or plants." These agents are distinguished from synthetic chemicals used as gases or poisons, or what is usually called chemical warfare Biological warfare thus has a very wide scope

Used in World War I

The report declares that biological warfare was used in World War I, and that "there is incontrovertible evidence that in 1915 German agents inoculated horses and cattle leaving the United States ports for shipment to the Allies with disease-producing bacteria"

The possible use of biological warfare was brought to the attention of the War Department in the fall of 1941 and Secretary Stimson requested a National Academy of Sciences committee to survey the situation and future possibilities

A supersecret committee called the War Research Service was organized in the summer of 1942 to take charge of biological warfare investigations Working with the Army, Navy, U S Public Health Service, the National Academy of Sciences, the National Research Council, OSS, FBI and other agencies, this organization asked the Chemical Warfare Service of the Army to take over a large-scale development and research program in November, 1942 The first laboratories and pilot plants were begun in April, 1943, at Camp Detrick, Frederick, Md Subsequently, field testing stations were established in Mississippi and Utah and large scale production was investigated at a plant in Indiana.

Only 60 Infections

Only 60 cases of proven infection caused by accidental exposure to virulent biological warfare agents are reported during the researches and all recovered completely or are recovering There were also 159 accidental exposures which received prompt treatment and did not develop infection, except one case in which the exposure was not reported, the disease developed and the person recovered after treatment

The biological warfare program was undertaken, the report states, "under the goad of necessity and aimed primarily toward securing for this nation and its troops in the field adequate protection against the possible use by our enemies of biological warfare agents Adequate defenses were devised and the possibility of surprise from this quarter was forestalled"

Of Lasting Value

Much information of great and lasting value for human welfare was obtained, the report claims Unique facilities were established for research and experimentation on pathogenic agents on a scale never before possible

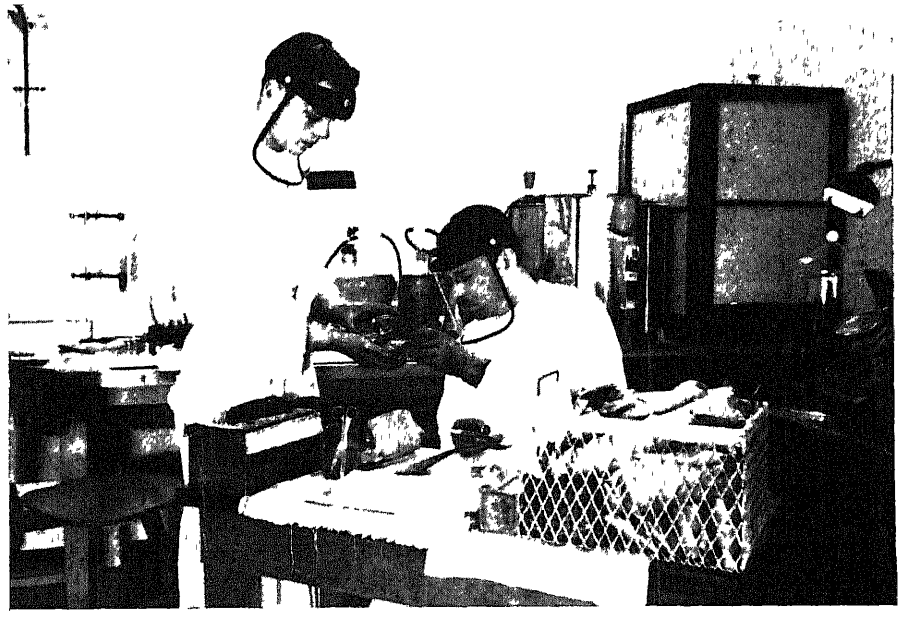
Important accomplishments of the biological warfare program listed in the report are

1 Development of methods and facilities for the mass production of microorganisms and their products.

2. Development of methods for the rapid and accurate detection of minute quantities of disease-producing agents

3 Significant contributions to knowledge of the control of airborne disease-producing agents

4. Production and isolation, for the



PEACETIME HEALTH AIDS—While investigating possible enemy use of infectious disease as a weapon, Naval Medical Research Unit No. 1 also assimilated information for control of communicable airborne diseases. Here an autopsy is held on one of the animals infected during the course of studies at the University of California. Official U. S. Navy photograph.

first time, of a crystalline bacterial toxin, which has opened the way for the preparation of a more highly purified immunizing toxoid

5 Development and production of an effective toxoid in sufficient quantities to protect large scale operations should this be necessary

6 Significant contributions to knowledge concerning the development of immunity in human beings and animals against certain infectious diseases

7 Important advances in the treatment of certain infectious diseases of human beings and animals, and in the development of effective protective clothing and equipment

8 Development of laboratory animal propagation and maintenance facilities to supply the tremendous number of approved strains of experimental animals required for investigations

9. Applications of special photographic techniques to the study of airborne microorganisms and the safety of laboratory procedures

10 Information on the effects of more than 1,000 different chemical agents on living plants

11 Studies of the production and control of certain diseases of plants

Still more is to be learned about biological warfare, the report warns, and the research "must be continued on a sufficient scale to provide an adequate defense"

In organizing the world for peace, the report declares, "the potentialities of biological warfare cannot be safely ignored

"Unlike the development of the atomic bomb and other secret weapons during the war," the report warns, "the development of agents for biological warfare is possible in many countries, large and small, without vast expenditures of money or the construction of huge production facilities It is clear that the development of biological warfare could very well proceed in many countries, perhaps under the guise of legitimate medical or bacteriological research"

Science News Letter, January 12, 1946

BIOLOGY-MEDICINE

International Effects

Germ warfare is bound to have widespread effects. Medical discoveries useful in peacetime are likely to justify war researches.

By WATSON DAVIS

➤ WE KNOW THAT Pandora's box of germ warfare actually exists. Although the lid was not opened in war, it is potentially as frightening as the atomic bomb The scientists are not yet permitted by the War Department to tell what they found in their supersecret medical and biological war researches

Until there are scientific reports naming diseases, telling about counter measures and giving hints for peacetime usefulness, we can neither assay fully the dangers nor tell definitely whether biological warfare researches will bring more good than evil

The Merck report released by the War Department, giving no credit to either the disease organisms studied or the scientists who studied them, is an obviously abbreviated document In all probability it was strenuously edited and bluepencilled in what Army officers conceived to be the interests of military security. It tells far less about biological warfare than the Smyth report does about atomic warfare

Conflicts are bound to rise and be aired in public between the scientists who want their traditional freedom of scientific publication and the military who wish to hold on to "secrets" Biological warfare scientists may find themselves joining the atomic bomb scientists in fighting for their scientific liberties

The biological warfare research was one of the most extensive coordinated medico-biological investigational programs in history Probably it cost somewhat less than a twentieth as much as the atomic bomb researches The cost was certainly in the scores of millions of dollars

If there had been a relatively full revelation of what has been done, the whole undertaking might have a different public reception.

At the same time the U S preparation for and against biological warfare—fighting with bacteria, fungi, viruses, rickettsiae, and toxic agents from living organisms—was announced, there was also made known by another agency the triumph of American chemistry over malaria through the development of a suppressive drug, SN 7618, better than both atabrin and quinine This is a most constructive war research, useful in peace

Probably a half-dozen similarly great medical achievements are hidden by the present biological warfare secrecy If they are announced promptly they might immunize the public against some of the horror of the idea of protecting ourselves against the use of diseases as weapons

Undoubtedly far more good than harm will come out of America's biological warfare researches It would have been

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foolish not to have developed all defensive and offensive angles of this potential weapon Our enemies were or could have been at work in their medical laboratories

On the eve of the United Nations Organization's first general assembly, even the facts about biological warfare so far developed may seem to add to the difficulties of building the peaceful world Like the atomic bomb, however, biological warfare makes a united peaceful world all the more urgent

The only hope is to bring germs and atoms alike into the open so that they may be controlled in the interest of all peoples

Science News Letter, January 12, 1946

BIOLOGY-MEDICINE

Harmful Effects Persist

Biological warfare doesn't stop with surrender or armistice; once it is let loose it cannot be brought under control again like other forms of war's destructiveness.

By FRANK THONE

➤ BIOLOGICAL warfare, loosing the germs of pestilence against whole peoples, will undoubtedly strike humane-minded persons as the ultimate in atrocities It isn't, necessarily people suffer just as agonizingly from flame-hurt and bomb-blast as they would from plague or cholera—or whatever diseases might be sown among them by an enemy

No, the worst horror about biological warfare is that once loosed it cannot be brought under control again Other forms of war's destructiveness are more or less self-limiting they run their course and stop The most awesome of them all, the atomic bomb, strikes with the suddenness of a thunderbolt Most of the thousands who died in Hiroshima and Nagasaki did not even have a hundredth of a second in which to realize that they were dying Other explosives, though more limited in scope, can be almost as instantaneous in effect

Incendiary fires, though self-propagating, are also self-limiting A town or a factory may burn for days, but when everything combustible has been consumed the fire goes out When the victor moves in, he finds the ruins charred, but cold

Even the worst of the poison gases, like lewisite and the nitrogen mustards, are limited in their effects They may contaminate an area so severely as to interfere with the advance of the user's own troops, but after a couple of good rains their curse is washed from the countryside

Not so, however, with the germs of disease that man may launch against his fellow man, or his ox and his ass, or his wheatfield and vineyard These are self-propagating but not self-limiting, except in the mysterious fashion that some epidemics have, of "running their course" But even then, there always remain some reservoirs of the disease, in which it remains latent for a time and then breaks forth again

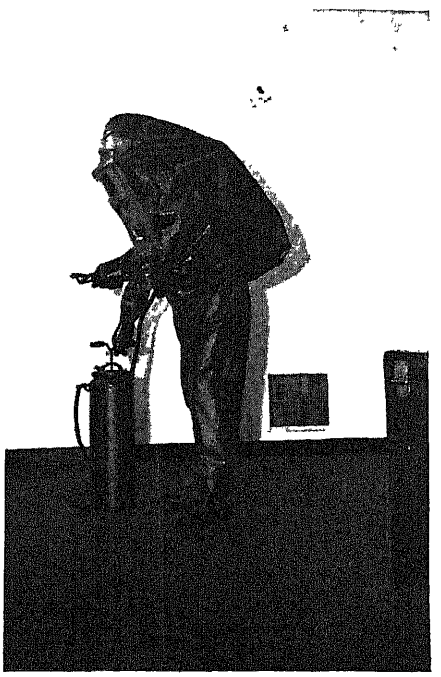
The same would be true of artificially propagated diseases of crop plants or of forest or orchard trees Once an infestation is let loose among them it is almost never eradicated One or two such plagues have been stopped, but only by most drastic methods and in limited areas, like the outbreaks of citrus canker and the Mediterranean fruit fly in Florida some years ago. For the most part, however, the story is one of heroic effort and final failure black stem rust of grains, late blight of potatoes, codling moth in fruits, are only three out of a thousand possible examples And their mischief was wrought blindly and spontaneously, they had no aid from a malicious enemy in getting started

We must face the fact that if one nation launches such uncontrollable agencies of harm against its neighbor, the war will never stop Plagues and pests recognize no surrender, know no armistice A germ-conquered people will make occupation unsafe for the conqueror's troops unless they are thoroughly immunized, and although the weakened survivors may offer no resistance to the victor's will they will be too inert to give obedience to his decrees Their wasted fields, with blights still sweeping on unchecked, will have little capacity to pay reparations

Such pestilence-ridden lands could easily forbid entry to victorious armies, even though the exhausted losers could not fire a shot against them, simply through fear of the black tributes of defeat that homegoing troops might carry back with them If intercontinental war is ever waged with biological weapons, it may become necessary to maintain intercontinental quarantines for years afterwards, with communications (if any) maintained only by cable and radio, and even the magnanimous victor's charity gifts of food and medicine dropped hastily from speeding planes or impersonally hurled across the oceans in rocketcraft

Biological warfare can be terribly devastating But it is a two-edged weapon, not to be lightly unsheathed

Science News Letter, January 12, 1946



***PROTECTION NEEDED**—Resembling a "Man from Mars," a man wearing a rubberized protective suit prepares to go about his duties at the Naval Medical Research Unit.*

SEISMOLOGY

Last Earthquake Of 1945 "Got Lost"

➤ THE LAST big earthquake of 1945 "got lost" and has only now been turned up by seismologists of the U. S Coast and Geodetic Survey, after a study of data transmitted by wire and radio through Science Service It was a very heavy shock, but probably produced no harm, for it shook the ocean bottom off the northern coast of New Guinea.

Epicenter location was in approximately 5 degrees south latitude, 147 de-

grees east longitude Time of origin was 12 48 4 p m , EST, on Friday, Dec 28

Observatories in England and Australia announced on incomplete data that the earthquake took place in the Antarctic regions This was an entirely natural mistake, for when earthquake locations are given on the basis of observations by only one station they may be fully 180 degrees off the compass bearing estimated by the observer Only when reports from three or more stations are available is it possible to strike intersecting arcs and pin the epicenter down to a definite locality

Seven stations reported to Science Service They were the observatories of the Jesuit Seismological Association at St Louis University, Weston College in Massachusetts and Spring Hill College in Alabama, the observatories of the U S Coast and Geodetic Survey at Honolulu, Tucson, Ariz , and College, Alaska, and the observatory of the California Institute of Technology at Pasadena

Science News Letter, January 12, 1946

PLANT PATHOLOGY

Could Attack Food Crops

Fungus-spore blasting of Japanese rice and other food crops could have followed atomic bomb if Japs had put up a fanatical resistance.

By FRANK THONE

➤ IF THE Japanese had put up the fanatical, last-man resistance on their home islands that many expected of them and used the biological warfare they were preparing, atom-bomb blasting of their cities might have been followed by fungus-spore blasting of their rice and other food crops, to starve out the scattered resistance forces hiding in the hills

By the same token, that kind of starvation strategy might be used against any people in a future war, if cities are broken up and populations dispersed to make the concentrated attack of atomic missiles difficult and unprofitable

Although no specific kind of disease-producing organism is mentioned by name in the just-released report by George W Merck, special consultant to the War Department, his definition of biological warfare explicitly includes the use of bacteria, fungi and other disease germs against plants as well as against men and animals The scope of biological warfare might properly be extended to include larger organisms, such as insects and parasitic worms, whether they cause disease directly, serve as carriers of diseases like malaria and typhus, or produce crop failures by ravaging the fields

One of the advantages that lies with the attacker, in this kind of warfare, is the enemy's inability to determine what is harming him until the mischief has actually commenced For any given crop, several distinct kinds of plant-disease germs are at the choice of the attacker, no two of which can be met with exactly the same means of defense

As a specific example, rice is attacked by half-a-dozen fungus diseases bearing such depressing names as blast, black smut and mildew Sweet potatoes, another highly important food crop in Japan, has to contend with black rot, dry rot, ring rot, soft rot and white rust, which are all fungus-caused; also with burrowing nematodes, which are small, soil-infesting worms, with several virus-caused diseases, and with one or two bacterial rots Soybeans, a third great standby in the Orient, are attacked by at least five different kinds of fungi, four or five kinds of bacteria causing blights and leaf spots, a virus causing mosaic disease, and finally by a nematode that causes root-knot

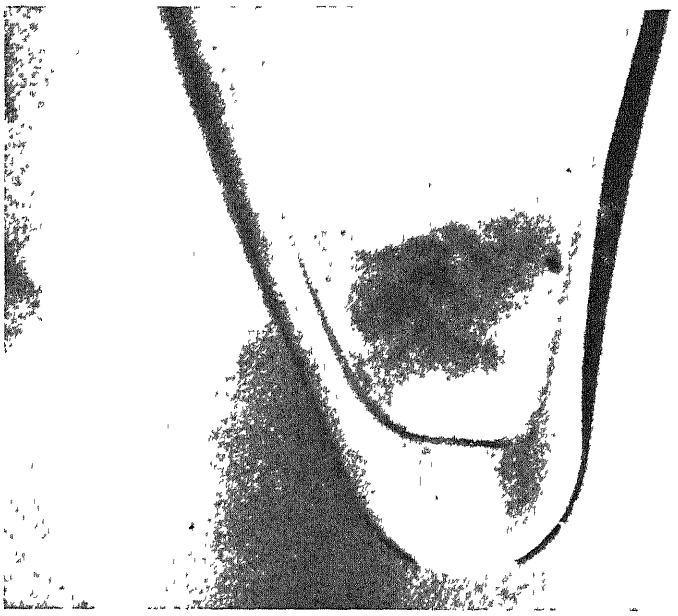
This array of farmers' woes affects only three crops, and does not include the insect enemies of even those Probably not all of these fungi, bacteria and viruses could be pressed into service for the purposes of biological warfare, but certainly enough of them could be to make the lot of the Japanese farmer even more unhappy than it normally is

In Europe, different crops have major importance, and different diseases would be used against them The attack would probably center on the grains, potatoes and sugar beets All the grains, including American corn which is extensively grown in the Danube and Po valleys, are susceptible to smuts, rusts and root rots, all of which are fungus-caused. There are plenty of other grain diseases, but these alone would cause plenty of trouble Potatoes are liable to the blight that caused the great Irish famine of the 1840's, as well as to several serious virus diseases; it might be possible also to sow striped American potato beetles across the fields from low-flying airplanes. Beets are susceptible to several virus diseases, to a number of rots that attack their big, juicy roots, and to such fungus-caused ills as root tumor, dry rot and leaf spot. Obviously, biological warfare might play hob with Europe's ability to feed its own population.

Still another kind of biological warfare might consist in sowing seeds of foreign weeds America has had plenty of bitter experience with alien plants even though



THIS IS NEPTUNIUM — Dark brown neptunium dioxide is shown at the bottom of a capillary tube. About 10 micrograms is shown and it is the first compound of this element to be isolated. This neptunium is the long-lived isotope 237 and it was isolated June 21, 1944, from uranium bombarded with neutrons from a cyclotron. Magnification is about 15 diameters. The scale shows millimeters and part of a dime appears in the photograph. Photograph from Dr. Glenn T. Seaborg, discoverer of elements 94, 95 and 96, who did chemical work on the atomic bomb elements. One isotope of neptunium is a stepping stone to the formation of plutonium, one of the atomic bomb elements.



ATOMIC BOMB ELEMENT—A compound of plutonium, isotope 239, one of the first pure compounds ever isolated, is shown as a colored cloudy mass resting on the rather thick bottom of a test tube. What is seen is about 20 micrograms of greenish-brown plutonium hydroxide and magnification is about 50 diameters. This compound was made about three years ago (1942) and the plutonium was made by bombarding uranium with neutrons from a cyclotron, predating by far anything made by the chain reaction used in making plutonium for actual use in the atomic bomb. The two or three white spots and black spot are merely imperfections in the photograph. Photograph from Dr. Glenn T. Seaborg, one of the discoverers of plutonium. Plutonium is one of the two fissionable elements used in the atomic bomb, the other being uranium 235.

they were not purposely introduced We might in turn export such baneful growths as bindweed or wild morning-glory, Canada thistle and cocklebur, all of which are native to this continent

Success in biological warfare would call for close cooperation of scientists Biologists of all kinds would have to work as hard, and perhaps on almost as sweeping a scale, as the physicists when they made atomic energy available for military purposes Meteorologists would have to be consulted even more closely than they are before the launching of an air attack or the use of the gases and smokes of chemical warfare, for the spores and other propagating bodies of the fungi, bacteria and crop-ruining parasites are very choosy about the conditions of temperature, moisture and sunlight under which they will operate Geologists and soil chemists would very likely have a word to say about the chances of the germs falling on favorable ground

Taken all round, then, biological warfare directed against the enemy's food supply would call for the intensive application of much knowledge and skill by many scientifically trained men But if it proved successful, its effects would be as damaging in the fields as a rain of fire-bombs over a city

Science News Letter, January 12, 1946

AERONAUTICS

New Long-Range Patrol And Search Bomber

➤ A NEW Navy long-range patrol and search bomber, recently announced, is the first Navy land plane conceived and built especially for this particular purpose It has a range of more than 3,500 miles with a full patrol load, a speed of over 300 miles an hour, is equipped for fighting if necessary, and carries a ton of the very latest radio and radar apparatus

The new plane will be designated as the P2V, Neptune, and was built by Lockheed Aircraft Corporation The first Neptune has already been extensively tested, and additional planes will be delivered soon

Neptunes are designed to be used to patrol regions around Navy continental and island bases, and to search waters ahead of a moving fleet For the purpose, a self-sustaining plane is necessary, one that can fly long distances, cover wide expanses with its search radar, protect itself and deliver an accurate attack From nose to tail, it is fitted for long-out, lone-wolf tasks

This patrol plane is equipped with two Wright 3350 radial engines and with four-bladed propellers It can fly on one engine in an emergency It is armed with six 20-millimeter cannon, 16 five-inch high-velocity aircraft rockets, and four 50-caliber machine guns It can carry 8,000 pounds of explosives, including two aerial torpedoes

The gross weight of the Neptune is 58,000 pounds A high degree of maneuverability is claimed for it because of its particular design It is a mid-wing monoplane with a wing-spread of 100 feet Its fuselage is 75 feet long, and the plane has tricycle landing gear Its normal crew is seven

Science News Letter, January 12, 1946

ICHTHYOLOGY

Only Three "Left-Eyed" Flounders on Record

➤ THERE ARE only three authentically known cases of winter flounders with eyes on the left side of their heads instead of on the right, states Dr E W Gudger of the American Museum of Natural History Of these, only one is now represented by an actually existing specimen, which is in the American Museum collections (*Science*, Dec 28)

Flounders and their ichthyological relatives are odd fish In early youth they settle to the bottom and lie down on one side all the rest of their lives, except for very brief spurts of swimming Their "underneath" eyes migrate around so that both right and left eyes come to be on the same side of the head

Some species apparently flop on either side more or less indifferently, so that "right-eyed" and "left-eyed" specimens appear in more or less equal numbers However, in the winter flounder, known scientifically as *Pseudopleuronectes americanus*, the tendency to lie on the left side and have eyes on the right is practically universal. Only the three exceptions noted by Dr Gudger have ever been seen

Science News Letter, January 12, 1946

There are over 50 *electric devices* that can be used in average homes.

ASTRONOMY

War-Ruined Observatory Will Be Rebuilt

➤ A NEW astronomical observatory will rise upon the ruins of war-destroyed Pulkovo Observatory, near Leningrad, it was announced by President A Mikhailov of the USSR Academy of Sciences Astronomical Council in a message of new year's greetings from Russian astronomers to their American colleagues

Hope that the forthcoming year would be a year of still closer collaboration and friendship among the scientists of the two nations was expressed by Prof Mikhailov

The southern branch of Pulkovo Observatory at Siemeis in Crimea was also destroyed, Prof. Mikhailov recalled, by "the most cunning and aggressive enemy who brought such great destruction to the peace-loving people of the Soviet Union and their cultural and scientific institutions"

"The astronomical year 1945 that is ending brought the greatest victory to the Allied armies in which American, English and Russian soldiers fought side by side," the Soviet astronomical leader said.

During the celebration of the 220th anniversary of the USSR Academy of Sciences last summer Dr. Harlow Shapley, director of Harvard College Observatory, and Astronomer Royal Sir Harold Spencer Jones visited the Pulkovo Observatory ruins and expressed the hope that the famous observatory would be rebuilt.

Science News Letter, January 12, 1946

CHEMISTRY

Plastic-Coated Yarn For Superior Insulation

➤ A PLASTIC-COATED yarn provided U S Navy vessels with electrical insulation said to be superior to the insulation used by other navies, it is now revealed The relatively new material is also waterproof, rustproof and immune to extremes of temperature, and is resistant to mild acids and alkalis Fiberglas, cotton, or rayon thread is used under the plastic coating.

Both Army and Navy used the plastic-coated yarn for other purposes than insulation, particularly for window screens, where its strength and immunity to rust make it especially serviceable. It will now find many applications in civilian uses, ranging from perspiration-resistant girdles and foundation garments to industrial conveyor belts and fish lines A heavy webbing of the material is suitable for wide use in furniture that may be left outdoors in all kinds of weather

This plastic-coated yarn is known as Plexon, and is made in New York by Freydberg Bros-Strauss It was developed by two French chemists

Science News Letter, January 12, 1946

CHEMISTRY

New Chemical Compound Dyes Nylon Thread Cheaply

➤ NYLON THREAD may be dyed cheaply by use of a new chemical compound in the alkyl phosphate family with which successful tests have now been completed It will be known as Phosphate No 12, and is the result of work of scientists in the laboratories of the Victor Chemical Works in Chicago Heights, Ill.

The chemical is a dye-carrying penetrant which simplifies the dyeing process, company officials state. It can be used in equipment already standard in modern dyeing plants In addition to providing even penetration of the nylon thread or yarn under treatment, the new phosphate is foam-free, an objective toward which chemists have been working for years It is stable in the presence of both acids and alkalis, and is non-ionic or neutral in electric charge, it is claimed.

Science News Letter, January 12, 1946

CHEMISTRY

Silicone Oils Flow At Minus 121 Degrees

➤ SILICONE oils suitable for use as hydraulic fluids in aircraft systems, that will continue to flow at 121 degrees below zero Fahrenheit and do not oxidize or sludge at 302 degrees above zero, have been developed in the General Electric laboratories in New York They can be used also in fine instruments, watches and clocks, and as an insulating fluid in certain electrical apparatus.

These oils are prepared with methyl silicone polymers, according to Dr. Eugene G Rochow of the General Electric Company He explained that these polymers, in the form of elastomers, produce a silicone rubber that does not decompose at 400 degrees Fahrenheit or harden at 67 degrees below zero, and maintains its elasticity under load over long periods of time at the high temperature of 302 degrees

Science News Letter, January 12, 1946

IN SCIENCE

CARTOGRAPHY

Terrain Models Made With Two New Devices

➤ CONSTRUCTION of three-dimensional terrain models, long known to map makers, but too costly and inaccurate for popular production, has been revolutionized into a science, with the invention of two devices, the Atcorob and the Orthojector Designed and constructed during the war to prepare models for operational planning, these inventions permit production of accurate and detailed models of any area on the globe

The Atcorob is an ingenious device that accomplishes in two operations what formerly required eight different procedures Contour lines from a topographic map can be quickly and accurately indicated on a block of solid plaster and reproduced by carving down to the surface of the image. Contours appear on the model exactly as on the map except that they are three-dimensional

"No other device or method of construction has approached the Atcorob in ability to reproduce terrain features," said Maj. Wallace W. Atwood, Jr, Chief of the Staff Service Model Section of the War Department.

The Atcorob was conceived by Maj Atwood, Prof. H L. Cooke of Princeton University and Capt A H. Robinson, Chief of the Map Division of the Office of Strategic Services It takes its name from the first two initials of the inventor's names The equipment was designed by Prof Cooke and Dr R Prickett, and constructed by them at the Palmer Laboratories in Princeton, N J

The Orthojector, devised by the same group, is helpmate to the Atcorob and makes possible a projection of map or photo transparencies onto the surface of any type relief model Information may be transferred onto a flat or irregular surface without the distortion obtained in the previous single-lens projectors.

The information projected onto the surface is in its correct position Roads go through correct passes, rivers through their valleys. The Orthojector is the only instrument thus far produced which assures accurate projection such as this on a relief surface

Science News Letter, January 12, 1946

E FIELDS

MEDICINE

Heavy-Weight Carbon To Aid Medical Research

➤ FOR USE in research on cancer, diabetes, arterial, heart and other diseases, carbon of atomic weight 13 will be produced in substantial quantities, the Sun Oil Company and the Houdry Process Corporation announced

This heavy carbon isotope has been used in biochemical research for the past two years and now two plants are to be constructed to produce it in larger quantity, increasing from 500 to 1,000 times the world supplies of this chemical element.

Carbon 13 is concentrated by thermal diffusion, separating it from ordinary carbon 12. The new plants will bring the cost down to about $40 a gram, whereas the experiments were started with less than a half-gram which cost several thousand dollars to concentrate

Carbon 13 serves as a tracer in chemical reactions in living and non-living material since by its different weight it can be spotted and told from ordinary carbon

The work was initiated and carried on by Dr Aristid V Grosse of the Houdry organization, assisted by Dr E A Smith, Houdry research director, Dr Stanley P. Reimann, director of the Lankenau Hospital Research Institute of Philadelphia and others in these two organizations

Science News Letter, January 12, 1946

PSYCHOLOGY

Talking Books Make Reading Quicker for Blind

➤ BLIND children in the third and fourth grades "read" about three times as fast with talking books, which are simply a series of phonograph records, as in braille, where the alphabet is represented by a pattern of dots embossed on paper

But this does not mean that talking books should replace braille in schools, states Dr Berthold Lowenfeld, Director of Educational Research of the American Foundation for the Blind In the upper grades, students who have become proficient in braille get more out of reading difficult material in the dot-pattern than from listening to talking books

While less bright blind children in the third and fourth grades understand the lesson better when talking books are used, in the sixth and seventh grades blind pupils of low intelligence get more out of textbook material when reading braille Braille can be read at the pupil's own rate of comprehension, while the records must be played at a definite speed irrespective of the child's ability to understand the subject matter

Both braille and talking books should be improved, however, Dr Lowenfeld believes Better methods of teaching would enable the pupil to read braille more rapidly Talking books can be made more interesting and hold the listener's interest better by using sound effects and, perhaps, dramatizations.

Tests to compare the advantages of talking books and braille reading were given to 481 children in 12 schools for the blind.

Science News Letter, January 12 1946

ANTHROPOLOGY

Fossils of Early Man Survive Japanese War

➤ INFORMATION received by Dr Franz Weidenreich of the American Museum of Natural History indicates that fossil skulls and other remains of very early human types, in areas overrun by the Japanese during the war, have survived the vicissitudes of conquest and reconquest.

From his long-time co-worker, Dr G H R von Koenigswald, who just before the war had made several significant finds of ancient human fossils in Java, he has had a letter telling of hardships endured during the Japanese occupation, but stating that only one of the skulls from the Mgandong site had been taken to Japan and presumably lost. All the others were again in his possession, and at the time of writing (Oct. 23) he was hoping soon to return to his digging

Frank Whitmore, a colleague of Dr Weidenreich's, found in the Imperial University of Tokyo a collection of bones and artifacts from Choukoutien, China, the place where Peking Man was first discovered, together with the original research records of Dr Davidson Black, who first made systematic excavations at that site, and other important papers Arrangements are under way for the return of this important scientific material to the institution to which they belong, Peiping Union Medical College

Science News Letter, January 12, 1946

PSYCHOLOGY

Rats Housed in Groups More Likely to "Freeze"

➤ WHEN laboratory rats aggravate experimenters by "freezing" or playing dead instead of running through a maze, it may be the result of living with other rats

The habit of some rats to simply sit at one point in the maze instead of trying to find their way out has in the past been ascribed to emotional disturbances or "pure cussedness" But Dr Bernard F Riess of Hunter College decided to put the matter to a test.

Two groups of rats were used in his experiments, one group lived in "tenements," six rats to a cage, while the others were given private quarters Fighting was common among the "roommates"

The "freezing" behavior was indulged in by 18 of the 124 rats living in groups, Dr Riess states in the journal, *Science*, while only two of those from the private quarters had acquired the annoying habit Fifteen of the rats that "froze" were consistently victims of aggression in the household fighting, only three were dominant or habitual winners

Science News Letter, January 12, 1946

ENGINEERING

Electrodes in Sparkplugs Now Grow with Use

➤ SPARKPLUGS with electrodes that grow with use instead of wearing away, and a new airplane ignition system for high-altitude flying, are recent contributions to aviation developed by the electrical engineering department of Yale University The life of the sparkplugs is considerably lengthened by the development, and in the new system they are fired by radio frequency currents.

The special electrodes with which the sparkplugs are equipped grow in physical length as they are used, by approximately the same amount that the ordinary electrodes wear away This keeps the spark gaps more nearly constant, and doubles the length of life of the plugs, it is claimed.

The principal feature of the new ignition system is the use of high-frequency currents to fire the new sparkplugs The two developments constitute a valuable combination in planes, particularly at extremely high altitudes They were developed at Yale by Gregor Lang of the American Bosch Company

Science News Letter, January 12, 1946

PSYCHOLOGY

Selecting Secret Agents

Men's actions were tested for OSS service under conditions of strain and also relaxation. Method may be adapted for picking executives, diplomats.

By MARJORIE VAN DE WATER

➤ HOW the super-secret agents of OSS were picked for duty overseas has now been revealed An intensive three-day test showed a staff of examiners how the candidates for delicate missions into enemy territory could work and deal with other people under grueling conditions of mental or physical strain, or under the relaxing influence of liquor and quiet conversation. The new method may in future be adapted for picking high-powered executives, diplomats, salesmen, G-men, or leaders of men for important peacetime posts

An obstacle course, intelligence tests, cross-examination Nazi-style under blinding lights, opportunity to drink hard liquor, and casual observation while the candidates were eating or relaxing for recreation were all parts of the thorough "assessment of the whole person" that made up the OSS examination as reported by Lt-Col H A Murray, of the Office of Strategic Services, to the Military Division of the American Psychological Association Col Murray had the assistance of Dr Donald W. MacKinnon

Successful Selection

About one out of five was "not recommended" for overseas service Another one out of five did not succeed in going for other reasons But of those who were sent abroad on their perilous missions, only about six out of a hundred failed to make good, it was shown by a survey of the first 300 sent Their tasks varied from parachuting into enemy territory for sabotage or subversive activity to writing propaganda leaflets in the comparative safety of London under a rain of Nazi bombs.

During the three-day test period, the candidates, in groups of 18, lived on a country estate outside Washington where they associated day and night with the senior staff of officials testing them This staff consisted of psychologists, psychiatrists and sociologists

The secrecy and mystery popularly attributed to OSS was extended to the examining staff who were not permitted to know the identity of the men they were testing The candidates arrived with fictitious names and dressed in disguising Army fatigue uniforms

No one could tell whether a candidate was a general, a lieutenant, a private or a civilian—and all were included among those tested No candidate knew the rank of the man next him, and that itself served as a kind of test

The first night the candidates were given standard intelligence tests and other tests where they were required to fill in missing words designed to bring out tendencies to think in a peculiar manner Later they were each given a one or two-hour interview by one of the staff who had previously studied the test records They were given a test where they had to find the way out of a difficult situation; some of these were staged outdoors They had to run a difficult obstacle course to demonstrate their physical agility and strength A contrast to this was the task of sitting down and writing propaganda leaflets intended to break up the morale of the enemy

Another novel test they had to face was the psycho-drama now being used widely for training purposes and as therapy for the mentally and emotionally ill The candidates would be put on a stage to act out a drama, but instead of having fixed parts to learn, they were placed in a prearranged situation and had to make up their own lines as they spoke them The idea was to meet the situation in the best way

The candidates were pressed into service as examiners Each man was asked to write a character sketch of each of five other men whom they had learned to know well They had to answer certain questions such as whether they would pick him for a leader and whether he would do well in a perilous job

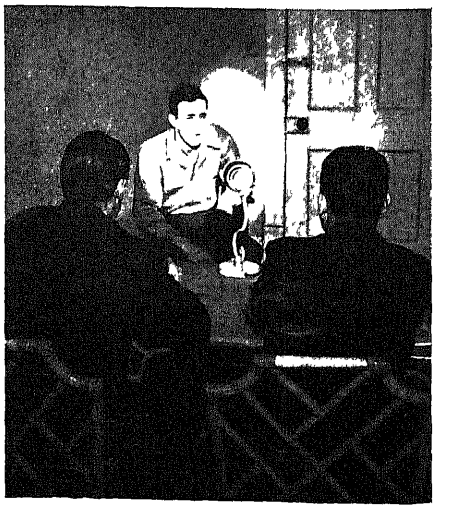
There was a "brook test," in which they were taken to a brook running through the estate and told they had to move a heavy but very delicate instrument across the brook alone with only the aid of some boards, rope and tackle that were there on the ground Another test was applied to them when they were required to form a group for discussion, electing a chairman and conducting the debate The purpose of this was to see who would assume leadership, who would try unsuccessfully to get it, who would produce the best ideas for discussion and how well all could work together without outside orders or direction

In another test each man had to work on a construction job He was told that it was not possible to complete the task in the time allowed but he could have the assistance of two men The men were actually stooges who began by helping, but later one showed that he was lazy and stubborn and the other was very active but full of absurd ideas and later insulting No one proved able to complete the construction. Some went to pieces emotionally What they did when angry was revealing.

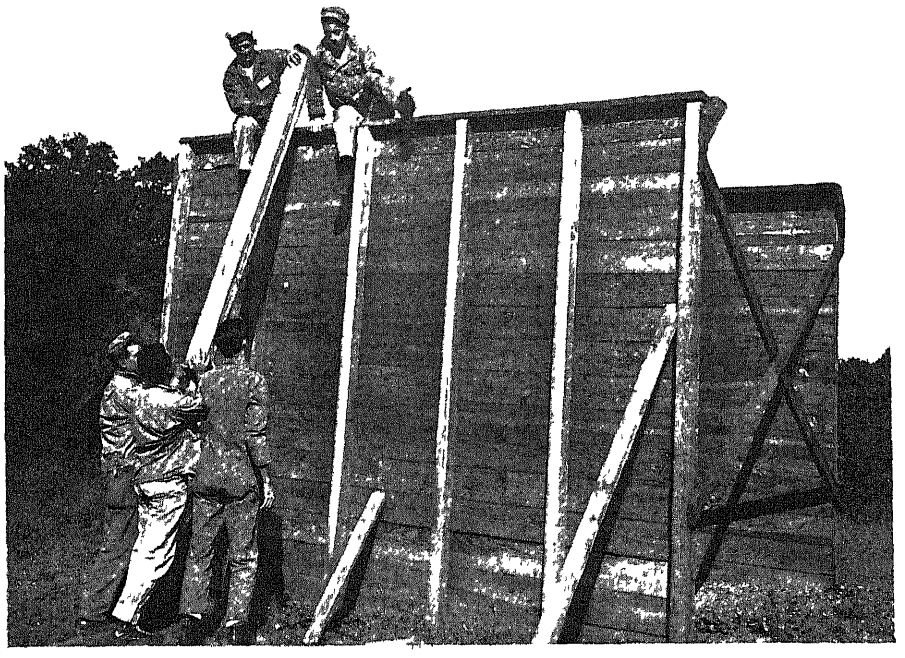
Cross-Examination

In another test each man was told to assume that he had been caught going through secret documents and had to give an explanation to officials This was followed by the grueling cross-examination

Final test came on the last evening when they were told that all the hard tests were over and that they might relax Strong liquor was available to all who wanted it and an informal discussion was started on what to do with Ger-



NAZI STYLE—Agents for overseas duty had to be able to stand up under grueling cross-examination. OSS photographs.



EXACTING TEST—Ingenuity as well as agility is necessary to get this "camouflaged king-size bazooka" across the chasm between the two walls. It happens that, with care, the bazooka can be made to just reach across so that the men can use it for a bridge and this is just about the only method for getting over—a good test for candidates for the OSS.

many after the war Liquor loosened tongues and many men expressed ideas that they might have hesitated to mention otherwise. The talks were always interesting and often continued until two or three in the morning

Details of the testing method will be described in a book, *Assessment of Men*, now in press (Houghton-Mifflin)

It is expected that the methods worked out for selection of OSS men will have important applications in industry and civilian selection now that the war is over

Although it is not likely that this particular test set-up would be useful in peace except perhaps for selection of FBI agents or police officers, the idea of assessing an applicant's total resources instead of some one qualification such as intelligence or speed in typing would be applicable to a multitude of selection needs

For many jobs, personality factors are quite as important as is mental keenness or trade skills But bravery, calmness under heckling, ability to control temper, facility in persuading a group to take some action, are much more difficult to assess than is the ability to figure interest on an investment or sort cards alphabetically

The testing method worked out under Col Murray illustrates the importance of studying the job and determining the qualities needed It shows the value of using a staff of examiners from the different fields of psychology, psychiatry and sociology with perhaps other fields represented for other types of job It shows that you can learn something about men by living in the same house with them for a few days and associating with them at meals, over a game of tennis or chess, or relaxed in an easy chair for a friendly "bull session" in the evening.

After such social contact, the staff of examiners may place a higher evaluation on the individual worth of a particular applicant than his written examinations would lead to

In such informal situations, the applicant for insurance salesman or college president, foreman or bank examiner, receptionist or handler of complaints, lecturer or floorwalker could "show their stuff" as they never could in the artificial situation of an examining room or brief, formal interview

Science News Letter, January 12, 1946

CHEMISTRY

Mercury Chlorine Cell To Be Studied in Germany

➤ A COMMISSION representing American domestic chlorine producers will soon visit Europe to secure full technical information relative to the German mercury chlorine cell Another group, in America, will determine the place and scope of tests for two types of the cell which will be brought to the United States by the Army Chemical Warfare Service Both committees are sponsored by this Army service.

The program to exploit the German mercury chlorine cell and make it available to American industry was launched by the Chemical Warfare Service in cooperation with the American chemical industry This cell has been developed much further in Germany than in the United States, it is reported. It was given impetus by war expansion of the German caustic and chlorine industry, abetted by the cheapness of mercury there due to relations with Spain, the mercury-producing country, during the war

One advantage of the mercury cell is that it eliminates expensive evaporating equipment A new vertical rotating type used by the Germans toward the end of the war requires much less floor space than conventional horizontal types.

A trend toward liquefaction of chlorine by means of higher compression, followed by water cooling without artificial refrigeration, was also noted in Germany by representatives of the Chemical Warfare Service in a survey of German chemical processes following VE-Day A new type of rectifier, which was alleged to operate at high efficiency in the lower voltage range, was reported in at least two of the newer installations

Improved methods of chlorine production will benefit the United States government, the chlorine industry and the American public Large quantities of chlorine are now used in various industrial and other processes, particularly in bleaching and in water purification

Science News Letter, January 12, 1946

Sugar is one of the four staple foods of the Iranian people, the others being bread, rice and tea, Iran produces sugar for about one-third of its requirements

Corn in tropical countries is in danger of fermentation, due to the warm climate and the high humidity, unless it is dried immediately after harvesting.

Do You Know?

Snow reflects about 75% of the sunlight falling upon it

X-rays are used in treating successfully many skin disorders.

New radio *noise filters* eliminate static or buzzing in electrical equipment and make radio reception better

The *Gila monster*, only poisonous lizard found in the United States, is especially fond of eggs.

Bottles with a plastic coating are being used to hold certain acids and other liquid chemicals, even if the glass bottle becomes cracked the flexible plastic will hold in the contents.

Mining in the Philippines in prewar days gave direct employment to about 250,000 persons; rehabilitation of the industry is slow because of Japanese theft or destruction of buildings, machinery, tools and supplies

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BOTANY

NATURE RAMBLINGS by Frank Thone



Winter Fruits

➤ FRUITS, we are accustomed to think, are things belonging to autumn and late summer, not to winter We are also used to thinking of fruits as something suitable for eating, peaches and plums, pears and quinces, apples and grapes It hardly occurs to us to consider as real fruits such things as the seed-balls of sycamore trees, or the peppercorn-like "seeds" of lindens, suspended beneath their oddly-built but efficient gliders

Yet these dry, unappetizing objects are true fruits, in the botanical sense of the term The plant scientist, who tries to see things from the plant's point of view, defines a fruit as a seed or seeds, plus associated structures Thus, acorns are fruit, and so are the winged "keys" of maple and ash, and even the scaly cones of pines and firs and spruces.

Fruits do two things for the seeds they enclose they give them protection from the weather, and they provide means for dissemination into new territory The fleshy pulp of edible fruits—the "real fruits" of everyday definition—gets mammals and birds to swallow them, and the seeds, in their digestion-resistant coats, thus get free rides, sometimes to considerable distances But the glider-wings attached to maple and ash and linden seeds are good carriers, too, especially in a winter storm; and so is the little pinch of downy fluff attached to the small seed of the sycamore, released to serve as a parachute when the crust of the tight little ball is broken

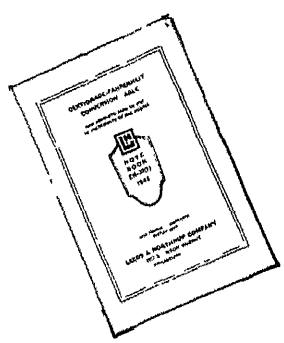
Some of the winter fruits we see stick to the tree as a matter of necessity. Many species of oaks take two seasons to mature their acorns; those that were fertilized last spring will not be ripe until next fall The same is true of some kinds of pines and other conifers. And there are some species of pine that keep their cone-scales tightly closed over the winged seeds beneath them until a fire sweeps through the woods Then the released seeds find a desolated world to be repopulated

Of course, not all winter fruits are dry and deadlooking and unappetizing. Plenty of them have a certain amount of pulp around their seeds· persistent-fruited crabapples and red-haws, buckbrush or coralberry, snowberry, several kinds of honeysuckle, false bittersweet, and the junipers that most people call cedars Such fruits may not appeal strongly to human appetites, but birds find them very acceptable in winter, and in return for the slight amount of nourishment afforded by their pulp will carry the seeds at least as far as the next roosting-place

Science News Letter, January 12, 1946

The *solenodon* of Haiti is a rat-like animal with an elongated nose like an anteater.

Deposits containing 1,000,000 tons of aluminous *laterite*, a mineral rich in aluminum and iron, have recently been discovered in northwest Oregon.



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PHYSICS

Radio Carbon as Tracer

Understanding of life processes may be aided by mass production of element as by-product of atomic bomb research.

➤ LONG-LIVED radioactive carbon, the production of which in relatively large quantity may well be one of the most valuable peacetime by-products of atomic bomb research, has been used for the first time in laboratory experiments, a group of University of California scientists have announced

The experiments, which bring man a step closer to an understanding of photosynthesis and provide new techniques for a study of the basic life processes, were conducted with the only known supply of long-lived radioactive carbon produced before the war, a fraction of a gram prepared over an 18-month period by cyclotron bombardment

Scarcity of the long-lived radio carbon has prevented its widespread use in nearly every scientific field Use of the element as a "tracer" of living processes by means of the radioactivity is expected to yield a vast fund of knowledge of value in the advancement of medicine, agriculture and other sciences

Carbon is the most common constituent of all living things, and its very omnipresence provides a yardstick of the potential value of radio carbon in bringing about further understanding of that element's functions

With the development of the uranium pile technique, as described in the Smyth report, it may be possible to produce larger quantities of carbon 14, the long-lived radioactive sister in the carbon family The pile technique makes available a larger and steadier stream of neutrons, the particles used to produce carbon 14, than is furnished by the cyclotron

The minute quantity of carbon 14 used in the Berkeley experiments was produced from 1,000 pounds of ammonium nitrate which were placed in tanks around the 60-inch cyclotron Stray neutrons from the machine transformed some of the nitrogen atoms of the ammonium nitrate into carbon 14

In the experiments just completed, the Berkeley scientists synthesized two simple organic compounds, acetic and butyric acid, by feeding heterotrophic bacteria radioactive carbon dioxide and ordinary sugar.

They succeeded in labeling all of the groups of atoms of the two compounds. Previously it had been possible to label one group of atoms in such organic compounds, using short-lived radioactive carbon, which is not suitable for many experimental purposes

The research indicates that many organic compounds may be labeled in a variety of ways for tracer studies, and make possible the study of the building up and breaking down of food substances in human and other living systems For example, it will be possible to study the conversion of sugars into fats in the animal body

Transformation of carbon dioxide is ordinarily accomplished only by photosynthesis, in which green plants use water, chlorophyl and sunlight to produce all carbohydrates, proteins, fats and other plant products

The ability to build up organic carbon molecules from carbon dioxide by biological means adds further knowledge on the still-mysterious photosynthetic process

Several years ago a group of Berkeley scientists carried on experiments with carbon 11, another radioactive sister in the carbon family However, carbon 11 has a half-life of only 21 minutes, giving researchers a maximum of four to five hours in which to experiment Carbon 14 has a half-life of 25,000 years, and is therefore suitable for long, complicated chemical procedures

The scientists who conducted the experiments are Dr H A Barker, associate professor of soil microbiology, Dr Martin D Kamen, formerly of the Berkeley Radiation Laboratory and now at Washington University, St Louis, Mo , and Victoria Haas, graduate student

Carbon 14 was discovered at the University of California in cyclotron bombardments by Dr Kamen and Dr Samuel Ruben, who died from an accident while conducting war research *(See also carbon 13 story, p 25)*

Science News Letter, January 12, 1946

The *almond tree* is a native of subtropical China, Persia, Syria, and Asia Minor



MEDICINE

Better Antimalarial Drug

Synthetic chemical, SN 7618, is better than atabrine, much better than quinine. Stops an attack of the disease in 24 hours.

By JANE STAFFORD

➢ THE WAR SECRET told of the development of two new and powerful drugs against malaria reveals at the same time a triumph of American chemists

Better than atabrine, much better than quinine is the synthetic chemical SN 7618 they created and sent to the Board for the Coordination of Malarial Studies for testing in April, 1944. This 7618th of the 14,000 substances tested for antimalarial activity turned out a winner

As a suppressive, for holding the sickness of malaria at bay even though the parasites have invaded the body, SN 7618 needs to be taken only once a week, compared to the daily dose needed when atabrine is used for the same purpose As a remedy, SN 7618 stops an attack of malaria in 24 hours, while atabrine takes four to six days to bring about recovery

No yellowing of the skin goes with taking the white pills of SN 7618 It does not cause stomach and intestinal upsets. Its manufacturing cost is about the same as that of atabrine

Chemically, this new antimalarial is a member of the 4-aminoquinoline series German chemists at the I G Farbenindustrie plant at Elberfeld had previously, and unknown to American chemists, made 4-aminoquinolines as possible antimalarials and they even had made and patented SN 7618 itself, 7 - chloro - 4 - (4-diethylamino-l-methylbutylamino) quinoline But they discarded it as no good

The triumph of American chemists consisted in recognizing its value and, even more, in developing a new method for synthesizing one of the intermediate chemicals needed to create SN 7618 Without this new method, SN 7618 could never have been made on a commercial scale, as it now can be

Whether SN 7618 will ever be put on the market seems a little doubtful because other, even better antimalarial chemicals are in the works One of these, an 8-aminoquinoline, shows promise of being a real cure for vivax malaria. Of three kinds of malaria, this one is most common in the United States and caused most trouble among our forces in the South Pacific

Atabrine and SN 7618 cure falciparum malaria, a less common but more often fatal kind, actually removing the infection They do not cure vivax malaria but merely stop each attack of chills and fever The parasites are still in the body and can cause further attacks, or relapses

Plasmochin, an 8-aminoquinoline developed in 1930, cures vivax malaria, but the dose for a cure is too close in size to the dose that causes poisoning symptoms A safer chemical of this type, with a greater "spread" between curative and poisonous doses, has just been developed and tested in patients. For 100 days the patients have gone without relapse of their malaria If they do not have any relapses during the next 250 days, the scientists will feel sure this latest chemical is the long-sought cure for vivax malaria

Development of these two new antimalarials, announced in the scientific journal, *Science* (Jan 4) was only a part of the work carried on in universities, government agencies and commercial firms by scientists whose efforts were coordinated by the Board for the Coordination of Malarial Studies

Altogether, 14,000 substances were tested These ranged from fertilizers, plasticizers, Nylon intermediates and rubber accelerators to Chinese herbs, mud from the River Nile, and eggshells suspended in choice whisky Some, the nylon intermediates, plasticizers and such, were picked from the shelves of organic chemical supply rooms. The odder items were sent by persons who had heard that eggshells in whisky, special muds, roots, herbs and so on, were good medicine for malaria.

The Board's scientists tested them all. It was easier, one member explained, to make the tests and send a scientific report than to write a letter explaining convincingly why the lower leaves of the cotton plant, for example, were not likely to prove a cure for malaria.

Chickens, canaries and ducks by the hundreds of thousands were used to screen the promising from the unpromising chemicals studied Those which proved effective against the malaria parasites in these birds were then tested for possible poisoning action in mice and

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other animals, including thousands of monkeys obtained through the aid of the National Foundation for Infantile Paralysis

When a chemical was found both effective and safe in these tests, it was tested in humans For these last stages in the testing program, conscientious objectors and prisoners at federal and state penitentiaries volunteered

Possibility of developing a vaccine against malaria was explored but has not shown promise

New knowledge of the malaria parasites themselves and their biochemical requirements has been gained and has aided and probably will further aid the search for chemical cures and preventives of malaria

Science News Letter, January 12, 1946

• Books of the Week •

ARGENTINA'S AGRICULTURAL EXPORTS DURING WORLD WAR II—Pavel P Egoreff—*Stanford Univ Press,* 52 p, charts 50 cents War-peace pamphlet No 8

CAMBRIAN HISTORY OF THE GRAND CANYON REGION—Edwin D McKee and Charles E Resser—*Carnegie Institution,* 232 p, charts and illus, $2 50 paper, $3 cloth Carnegie Institution of Washington publication 563

THE FUCHSIA BOOK—Alfred Stettler, Ed, *American Fuchsia Society,* 68 p, illus., $1 50 A collection of articles on the growing of Fuchsias

THE HEATING OF STEEL—M H Mawhinney—*Reinhold,* 265 p, charts and illus, $4 75 A practical discussion of those features of heating methods and of furnace tools which are important in obtaining the best results from the heating of steel.

HOUSEHOLD MECHANICS—Earl L Bedell and Ernest G Gardner—*Int Textbook,* 241 p, $2 75 Second ed Tells everything to know about the thousand and one "fixit" tasks necessary in maintaining a home

INSIDE THE VACUUM TUBE—John F Rider—*John R Rider Publisher,* 407 p, charts and illus, $4 50 An easy-to-understand presentation of the theory and operation of the basic types tubes

MEDICAL EDUCATION IN THE UNITED STATES AND CANADA—*American Medical Assn,* 80 p, tables, 50 cents. Forty-fifth annual report by the Council on Medical Education and Hospitals

MINIMUM DESIGN LOADS IN BUILDINGS AND OTHER STRUCTURES—National Bureau of Standards—*American Standards Assn,* 26 p, charts, 50 cents Recommended basic building code requirements that are being developed by technical committees under the procedure of the American Standards Assn

PATHOLOGY IN SURGERY—N Chandler Foote—*Lippincott,* 511 p, illus, $10 A textbook, covers the close relationship between the pathologist and the surgeon in the operating room, the surgical ward, and the pathologist's laboratory

THE SIXTEEN SOVIET REPUBLICS—*Information Bulletin, Embassy of USSR,* 32 p, illus, free Natural resources, agriculture, population, etc, of each republic

WOODWORKING FOR EVERYBODY — John Shea and Paul Wenger—*Int Textbook,* 187 p, illus, $2 75 An informal, non-technical book on how to make things with wood and how to finish wood

Science News Letter, January 12, 1946

OPTICS

Rotascope Makes Objects Appear to Stand Still

➤ WHIRLING airplane propellers appear to stand still when viewed through a new optical instrument developed by scientists of the General Electric Company. It is known as a Rotascope, and is said to be an optical system for untwisting the light of rotating objects before recorded by the human eye

It is claimed to be the first instrument of its kind which allows a continuous viewing of a rotating object at any particular point in its path of travel While it eliminates the rotary component of a whirling object's motion, it does not eliminate any flutter or vibration of the moving part In this is its primary value —by its use scientists are able to make a thorough study of the rotating parts of machinery

Science News Letter, January 12, 1946

The *mango* was brought to the western hemisphere, probably from the East Indies, by Portuguese navigators who planted it in Brazil 250 years ago.

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New Machines and Gadgets

⚙ *MAGNETIC stirring apparatus uses a rotating magnetic force within a housing upon which a laboratory flask may be placed, and a steel magnet enclosed in glass which is placed within the flask containing the liquid to be stirred In use the magnet in the flask revolves, following the magnetic field*

Science News Letter, January 12, 1946

⚙ *IMPROVED metal sheathing for roofing and sidewalls, known as Plasti-pitch, consists of steel sheets coated with a chemical compound that adheres to the metal under all weather conditions and protects it from rusting and chemical fumes The elastic coating is not injured by bending*

Science News Letter, January 12, 1946

⚙ *GRIPPING DEVICE, just patented, will hold one or more paint brushes, when not in use, suspended with their bristles in a suitable fluid to keep them soft It consists of two spring strips of wood at each end The brush handle is inserted between the strips*

Science News Letter, January 12, 1946

⚙ *ELECTRONIC fuel gauge for airplanes uses the basic principle of a change in the electrical capacity of a condenser when the dielectric changes from liquid to air It includes a tank unit, which is a simple condenser, a power unit, which contains electric and electronic parts, and a cockpit indicator*

Science News Letter, January 12, 1946



⚙ *GLASSES, to protect eyes in bright daylight for later night vision, look like ordinary sun glasses, as shown in the picture They prevent temporary night blindness due to excessive exposure to bright sunlight They transmit only 15% of the visible light and absorb glare and ultraviolet and infrad-red rays.*

Science News Letter, January 12, 1946

⚙ *ROLL FILM developing tank takes popular sizes of film and eliminates long hours in a dark room It can be loaded in any dark closet and then taken to a lighted room for developing The tank is made of an acid-resisting plastic*

Science News Letter, January 12, 1946

⚙ *ELECTRIC heater for homes has a rectangular base, and an arched top covered with a grill that extends well down the elongated sides Cold air enters at the bottom and flows upward over hollow ceramic posts supporting nichrome heater-wires The heated air passes out through the grill*

Science News Letter, January 12, 1946

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Question Box

AERONAUTICS
What are the special features of the new Navy P2V, Neptune? p 23

BIOLOGY-MEDICINE
How great will be the effects of biological warfare? p 20
How new is disease warfare? p 18

CARTOGRAPHY
What is the Atcorob? p 24

CHEMISTRY
For what will the new plastic-coated yarn be used? p 24
How may nylon thread be dyed more cheaply? p 24
What advantages does Germany's mercury chlorine cell have? p 27

ENGINEERING
How have electrodes in sparkplugs been made to grow with use instead of wearing away? p 25.

ICHTHYOLOGY
How many "left-eyed" flounders are there on record? p 23

MEDICINE
How may heavy-weight carbon aid medical research? p 25.
What synthetic chemical stops an attack of malaria in 24 hours? p 30

PHYSICS
How may a by-product of atomic bomb research aid in the understanding of life processes? p 29

PSYCHOLOGY
What are some of the exacting tests given OSS candidates? p 26

SEISMOLOGY
What earthquake "got lost"? p. 21

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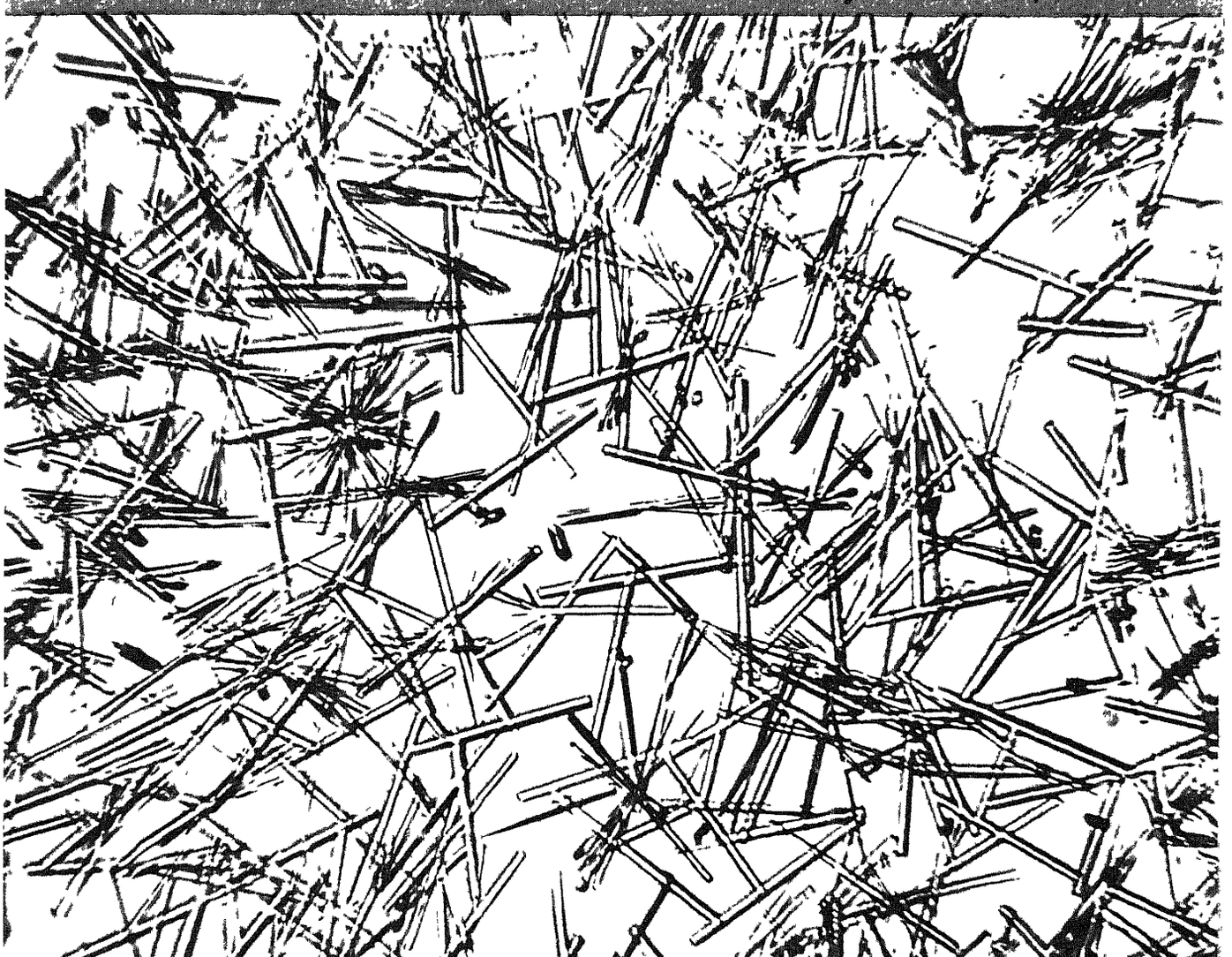
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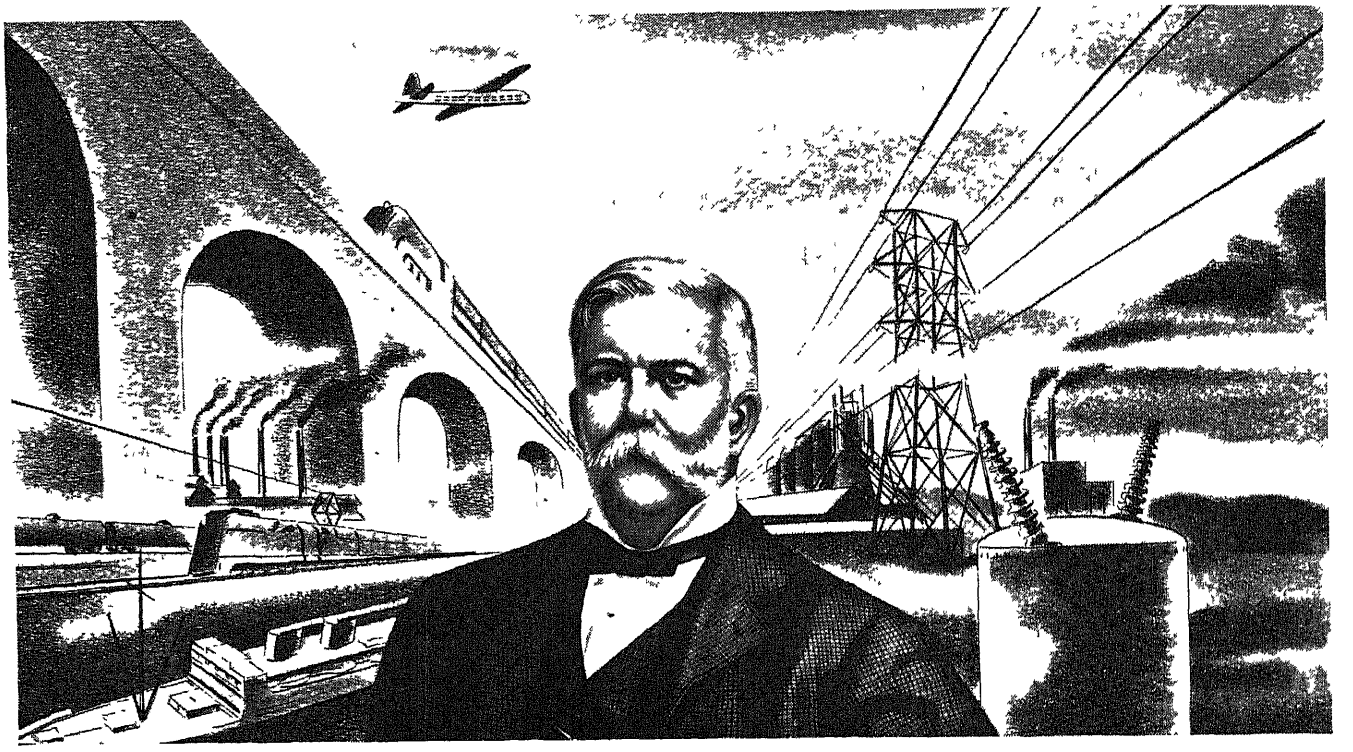


Death for Disease

See Page 39

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CHEMISTRY

Vitamin A Synthesized

Kept secret during the war to avoid aiding the enemy, the process seems to promise independence of fish liver oils as source.

➤ VITAMIN A, hitherto obtained from fish liver oils, has now been made synthetically, Prof Nicholas A Milas, of the Massachusetts Institute of Technology, announced at a meeting of the American Chemical Society in Cambridge, Mass

The synthesis was accomplished during the early part of the war but was kept a secret War interference with the fishing industry caused a shortage of this vitamin, particularly important for growing children and necessary for eye health at all ages To prevent wastage of the precious supply, the amount of the vitamin in multiple vitamin pills was restricted

Now it appears that we were becoming independent of fish as a source of supply and need not worry over any future shortage of the natural vitamin

Germany was also believed suffering from a shortage of this vitamin, in spite of the fact that she had access to some Norwegian fish liver oils The acute shortage of vitamin A containing fats suffered by Germany and her allies during the first World War has been held responsible for the breakdown in morale that contributed to their defeat in 1918 These considerations led to keeping information about the synthesis of the vitamin secret for the duration

Before the war, in 1937, one of Germany's leading organic chemists, Richard Kuhn, had announced a synthesis of vitamin A Attempts by other scientists in Germany and other countries to synthesize the vitamin by his process, however, were entirely unsuccessful.

The M I T workers investigated several processes before they succeeded in making the vitamin in the laboratory. The most successful process involves seven to eight chemical steps in which beta-ionone, ethyl chloroacetate, acetylene, and derivatives of beta-hydroxybutanone-2 are the principal raw materials used Starting from beta-ionone the vitamin A active product is produced in an overall yield of 10-15%

The biological potency of the product is only one-tenth to one-thirtieth that of pure vitamin A crystals obtained from natural sources, but is 50 to 100 times greater than that of ordinary cod liver oil

The synthetic process has not yet been translated from the laboratory to commercial production but some preliminary cooperative work was done along these lines during the war

Science News Letter, January 19, 1946



FUNGI TEST—Radar and radio equipment, switchboards, transformers and hundreds of other kinds of apparatus which went into the Pacific war theater in huge quantities were tested against attacks from every type of mold common to Pacific areas. Sixteen different kinds of fungi here receive their weekly meal of home-made bread to keep them robust and destructive. Photograph from Westinghouse.

MEDICINE

Alkalis for Poisoning

Victims of wood alcohol poisoning saved from blindness and death by new treatment. Must be given promptly and repeated at hourly intervals.

➤ VICTIMS of poisoning by methyl alcohol, popularly known as wood alcohol and smoke, can be saved from blindness and death by alkali treatment, four Naval medical officers report (*Journal, American Medical Association,* Jan. 12)

Good results with this treatment in 26 out of 31 cases were achieved by Comdr W. B Chew, Comdr E H Berger, Capt O A. Brines and Capt M. J Capron The other five died within three hours after being admitted to the hospital in a critically ill state

One of those saved was unconscious for about 12 hours.

The men had drunk wood alcohol in amounts estimated at from about three ounces to about one pint. Many also had drunk beer ranging in amounts to 21 cans

Washing out the stomach, giving fluids and purgatives has been the usual treatment The profound acidosis present has prompted the use by some physicians of alkali treatment which the Navy doctors also found gave good results.

The alkali is injected into the veins in the form of sodium lactate and given by mouth in the form of sodium bicarbonate If the patient is unconscious, the sodium bicarbonate is given by stomach tube The treatment must be given promptly and repeated, at about hourly intervals, three or four times until tests show the acidosis has been overcome

Within a few hours the breathlessness, nausea, cramps and mental symptoms abated Blurring of vision cleared within 24 hours in many cases When discharged from the hospital, after about two weeks, all but four of the 26 had as good central vision as before the poisoning. Another two regained apparently normal vision within the next three months

Science News Letter, January 19, 1946

CHEMISTRY

TDE Deadlier Than DDT For Mosquito Larvae

➤ TDE, a chemical compound related to DDT and sometimes found as an impurity in the commercial product,

proves to be even deadlier in its effects on mosquito larvae, state Dr C C Deonier and H A Jones of the U. S Department of Agriculture (*Science*, Jan 4) They tried the material in several different media of dispersal as both dusts and sprays over the water, and found that its effects were more persistent after a given lapse of time TDE is a convenience-designation, taken from the initials of the compound's generic name, tetrachloro-diphenylethane.

The experimenters state in conclusion "These laboratory tests are only preliminary, but TDE shows sufficient toxicity to warrant further study Although early advice indicated that the compound might be difficult to manufacture, from more recent information it appears that TDE may be manufactured on a large scale"

Science News Letter, January 19, 1946

ELECTRONICS

Coaxial Cable Ready

Will transmit television pictures and sound between Washington and New York. Is one link in 6,000-mile national network planned.

➤ COAXIAL CABLE, now ready for the transmission of television pictures and sound between Washington and New York, is but one link in a national network of over 6,000 miles planned by the Bell System, and will be used both for television and telephone Regularly scheduled intercity television service on this Washington-New York link will begin soon and will use the cable six nights each week Coaxial cable transmission seems to be preferred in long-distance television at the present stage of development

Television can be transmitted through the air by radio waves, but there are practical difficulties that must be met in long-distance transmission Television images can be sent very short distances over special telephone wires, but not far because electrical losses are too great The coaxial cable for long-distance television is a low-loss method of transmitting the broad band of frequencies which make up television signals The probability is that all three methods will be used in interconnected systems

One difficulty faced in the transmission of television images by radio waves, according to Walter Evans of the Westinghouse Electric Corporation is, that television waves travel in straight lines, and, for all practical purposes, stop at the horizon. This means, he says, that television broadcasts from the highest practicable tower erected on the ground cannot be received much more than 50 miles away

By use of radio relay stations the television waves can of course be transmitted much farther. These relay towers are spaced about 30 miles apart Such a television relay system is now under construction for experimental purposes by the Bell System between New York and Boston, and another between Chicago and Milwaukee The Bell System plans a television network that will consist of interconnected coaxial cable and radio channels.

Because of the difficulty of transmitting television images long distances from towers erected on the earth, the Westinghouse Electric Corporation recently announced plans to test out airborne relay stations in airplanes flying in lazy circles 30,000 feet above sea level. Waves sent out from transmitters in a plane at this height, it was explained, would blanket the earth's surface like a giant ice-cream cone, covering an area 422 miles across

A coaxial cable, itself lead-covered, contains usually from six to eight conductors. Each is a copper tube about the size of a lead pencil, with a heavy copper wire extending throughout its length and held in its center, out of contact with the tube, by plastic disks Each tube, with associated equipment, can accommodate a television channel, or 480 telephone channels

Science News Letter, January 19, 1946

CHEMISTRY

Waste Sulfite Liquor Put to Useful Service

➤ ONE OF INDUSTRY'S worst waste-and-pollution problems, disposal of sulfite liquor from paper and wood-pulp mills, is attacked from a new angle by Richard G. Tyler of Seattle, who has been granted patent 2,392,435 on the process he has worked out. Instead of trying to reduce the volume of the lime sulfite solution directly by evaporation, and thereby running into scale-formation trouble, he puts the spent liquor through a carbonaceous base-exchanger which has previously been treated with a solution of common salt—sea water will do

The solution comes out as a complex mixture of sodium salts, containing lignin and other residues of the wood After evaporation this can be burned under the boilers, supplying power The clinker or "smelt" that is left is rich in commercially valuable sodium salts

Science News Letter, January 19, 1946

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MEDICINE

Flu Research Was "Blind"

Biological warfare research team worked behind camouflage of much publicized studies on influenza. Defense developed against "centuries old killer."

➤ WAS PNEUMONIC plague one of the diseases our military authorities expected the enemy to use against us along with V-bombs and other more conventional weapons of war?

The Navy's report of its share in our biological warfare research suggests that it was, although in this as well as in the War Department's report no specific germ weapons are mentioned by name

Working behind a "blind" of much publicized studies on influenza, a Navy medical research team at the University of California developed a "Man from Mars" protective suit and other defenses against germ warfare, it is now announced

To this team, Naval Medical Research Unit No 1, headed by Capt. Albert Paul Krueger, was given the mission of investigating "the possible use by an enemy of a certain infectious disease."

The name of the disease is not stated but it is described as "centuries old and one of the greatest of killers" Elsewhere in the report are references to airborne diseases.

Airborne diseases include such relatively harmless if unpleasant ailments as chickenpox and the common cold and such centuries-old killers as smallpox, diphtheria, pneumonia, anthrax and pneumonic plague. Against smallpox and diphtheria we have potent weapons of defense in vaccination, toxoid and antitoxin. Since the discovery of sulfanilamide, pneumonia has no longer rated as a great killer That leaves anthrax, whose spores can be spread through the air, and pneumonic plague

Pneumonic plague is caused by the same germs as bubonic plague In the latter, the germs are spread by fleas from infected rats, ground squirrels and other rodents The pneumonic form spreads directly from a plague patient whose breath carries germs from his infected lungs to the air.

Strengthening the idea that plague may have been the disease NAMRU No 1 studied is the fact that its commanding officer is on military leave from his position as professor of bacteriology at the University of California at whose Hooper Foundation studies of plague have long been going on

Whether it was plague or some other disease, the Navy's research team escaped the killer it studied No infections due to the organisms studied occurred among the investigators Among the protective devices was an extensive modification of the apparatus devised for germ-free studies by Prof J A Reyniers and associates at the University of Notre Dame. It consists essentially of a series of air-tight metal tanks fitted with sight and glove ports and built to contain all essential bacteriological equipment as well as experimental animals

Before developing methods of defense against the disease, such as the "Man from Mars" suit for workers in prospective rescue or decontamination work, the Navy researchers investigated possible uses of the disease in offense This involved development of new techniques for growing highly infective germs in great quantity and for ultimately dispersing them in mists

Besides the rubberized protective suit with its own oxygen supply, the Navy researchers tested special anti-bacterial masks and vaccines, antibiotics (remedies of the penicillin class) and sulfa drugs Summing up the 33 months of hard and dangerous work, the Navy reports that

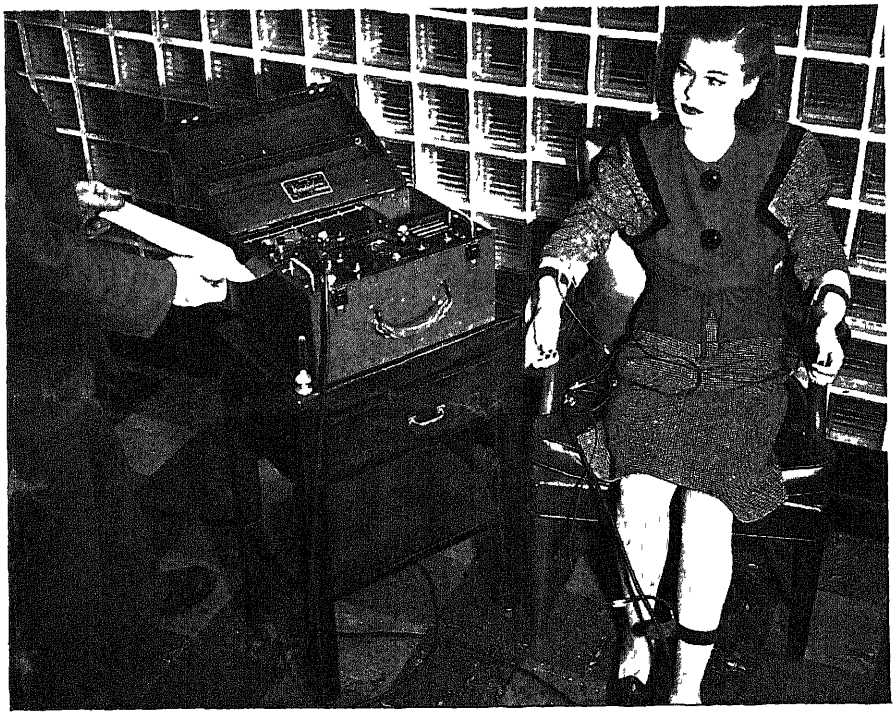
1 Considerable knowledge has been gained in mass defense against possible enemy employment of a certain disease, which is highly fatal.

2 Laboratory and field data have been gathered which demonstrate that a man-made epidemic as an instrument of war is a likely possibility.

3 A protective suit, with self-contained oxygen supply, has been devised for the use of workers in any prospective rescue or decontamination operation

4 Conclusive information has been obtained which would be of great value not only for protection from bacterial attack but for control of communicable airborne diseases among a peacetime population

Science News Letter, January 19 1946



DIRECT RECORDING—This portable electrocardiograph inks its record of heart action directly on paper without photographic darkroom procedures. The inventor, Paul Traugott, president of the Electro-Physical Laboratories, Inc., explained that his cardiotron can be used in the home by the physician if necessary.

ENGINEERING

Synthetic Lubricants

They contain no petroleum oils, are suitable for machinery and internal combustion engines, and are made from natural and other gases.

➤ NEW SYNTHETIC lubricants containing no petroleum oils, one suitable for use in machinery and in internal combustion engines, were described at the meeting of the Society of Automotive Engineers in Detroit They are made from natural and other hydrocarbon gases, and are the result of 25 years of almost continuous research

The report on the new lubricants was made by J C Kratzer of the Linde Air Products Company, D H. Green of National Carbon Company, and D B Williams of Carbide and Carbon Chemicals Corporation The development was conducted at the Mellon Institute of Industrial Research, Pittsburgh, and in industrial laboratories at Tonawanda, N Y and South Charleston, W. Va

One of the new lubricants was described as the LB series, insoluble in water and adapted to lubrication of machinery, including internal combustion engines, the other as the 50-HB series, soluble in water and satisfactory for lubrication of metal, rubber and other materials

Laboratory and road tests of automotive lubricants, known as LB-300 and LB-550, were said to show cleaner engine operation because of solvent action, easier starting at low temperatures, and smaller than normal deposits Tests with military engines were reported to show that the synthetic lubricants assure greater freedom from sludge and varnish formation, better starting and operation in cold weather, and only slightly greater leakage

The 50-HB series was described as being similar in properties to the LB, equal in lubricity, and completely soluble in water at room temperatures. They are satisfactory, the reporters stated, for use as brake fluids, cutting oils, and textile lubricants.

Outstanding advantage of both these series of new synthetics, they continued, is the possibility of exercising exact control, during manufacture, over viscosity and pour point The oils are products of American science and industry; they differ chemically from German synthetics, and are said to be superior to them.

Rubber Supplies

Potential world production of 3,000,000 tons of rubber annually, or more than twice the estimated annual consumption, was characterized by President John L Collyer of the B F Goodrich Company, as contributing to a complicated world surplus rubber problem which is a legacy of war

Mr Collyer recommended that, for purposes of national security, the American government accumulate a stockpile of natural rubber, and, further, maintain in operating condition plants capable of producing 600,000 to 700,000 tons of synthetic rubber annually

Fuels for Diesels

➤ DIESEL engines can no longer be regarded as accommodating and tolerant consumers of petroleum oils which cannot be used for other purposes The development of high-speed diesels has changed the situation, the diesel has become more selective in its diet, and is creating a demand for fuels having specific properties essential to efficient and prolonged operation.

This is the opinion of F. G Shoemaker and H M Gadebusch of General Motors Corporation, stated at the same meeting Experiments indicate, they said, that the type of service in which the diesel engine operates is the real criterion of its fuel requirements. Power developed by the diesel, they declared, appears to be directly proportional to the heating value of the fuel injected

Highway Plans

➤ FUTURE plans for the development of two- to six-lane highways were revealed at the meeting by Herbert S Fairbanks of the U S Public Roads Administration He described the plans as visualizing city streets, main highways, and rural roads as elements of a nationwide system unaffected in its natural development by political boundaries and partitioned administrative authority.

The plans, he said, call for arterial through-ways instead of by-passes to serve both intercity and local traffic, 224- to 300-foot rights-of-way, shoulders sufficiently wide to accommodate halted vehicles, and flat slopes on wide embankments for safety

Lane widths, he explained, will be standardized at 12 feet, with two lanes on highways serving less than 2,000 vehicles daily, four lanes where traffic reaches 3,000 to 15,000 cars daily, and six lanes for heavier travel

Rear-Engine Cars

➤ REAR-ENGINE passenger cars are a possibility by 1947, or whenever public demand develops They will have the economy of small models and the roominess of large vehicles, William B Stout of the Consolidated-Vultee Aircraft Corporation and the Graham-Paige Motors Corporation declared at the meeting.

Operation of an experimental car for 200,000 miles in eight years, he said, has demonstrated the practicality and advantages of rear-mounting of engines and of suspension that puts the vehicle's center of gravity below the level of support He declared that rear-mounted engines make for better traction and easier steering, and permit of such better utilization of body space as to give large-car roominess to small vehicles

Science News Letter, January 19, 1946

DENTISTRY

Fiberglas Used to Fill Root Canals of Teeth

➤ A SPECIAL form of radio-opaque Fiberglas yarn has been successfully used to fill root canals of teeth, Harry Maeth, D D S reported, (*The Dental Digest*). Its use has several advantages, he said, among them the ability to verify stages of canal filling with the X-ray.

The material is easily handled, Dr. Maeth reports It is worked into the canal from a piece about six inches long. Approximately 18 inches of yarn are required for the average-size canal The automatic hand mallet, in addition to hand pressure, quickly forms the Fiberglas into a compact mass.

Other advantages of Fiberglas include great tensile strength and high dimensional stability It is non-toxic, non-irritating, chemically stable and does not absorb water

Science News Letter, January 19, 1946

The *fantail pigeon*, by selective breeding, has had the number of tail feathers increased from the normal 12 to 30 or sometimes even more.

MEDICINE

War Waged on Cancer

Scientists who aided military victory now turning to fight for victory over cancer which killed twice as many Americans as enemy did.

➤ THE SCIENTIFIC might of the nation which gave such aids to victory as radar, flame throwers and atomic bombs, is now being mobilized for a long range fight to victory over cancer

This disease ranks as our Number One Enemy, Dr Frank E Adair, president of the American Cancer Society, declared at the society's annual dinner for the National Association of Science Writers, held in New York

"Between Pearl Harbor and V-J Day cancer killed more than twice as many Americans as did the Germans and the Japs," he stated "Unless we do something about it, 17,000,000 Americans now living will die of cancer It is exceeded only by heart disease as a cause of death Because it frequently means not only death but long and cruel suffering, it is the disease we dread most"

The nation spent $2,000,000,000 on wartime research on the atomic bomb The cancer society hopes the American public will contribute from $3,000,000 to $5,000,000 during 1946 for research for the war on cancer

The National Research Council, chief adviser of the government on the organization of wartime research, is now acting in the same capacity to advise the cancer society on cancer war research It has already recruited 90 of the nation's leading scientists to lay the battle plans and hopes to enlist in the fight men now being released from the armed forces, it was announced at the dinner meeting Funds for fellowships for such workers will be provided, Dr Cornelius P Rhoads, director of Memorial Hospital and chairman of the committee on growth which will guide the over-all planning, stated

Information and materials from atomic, chemical warfare and other war researches will, so far as military security permits, be made available to cancer research workers, it is hoped Negotiations for this are now under way with the Secretary of War, Dr Rhoads announced

While coordination of the nation's scientific abilities and activities brought enormous and rapid advances, application of the same kind of coordinated attack on cancer has certain differences, Dr Lewis H Weed, chairman of the committee of medical sciences of the National Research Council under which the committee on growth has been organized, pointed out

"Wartime research was chiefly concerned with applying knowledge which had been previously discovered," he stated, "while problems like that of cancer require the discovery of new knowledge"

Even with our present knowledge, however, "upward of 5,000,000 persons now living in America can be saved from death by cancer if they learn the danger signals of this disease and the importance of seeking medical aid at first sign of trouble," Dr Clarence C Little, director of the Roscoe B Jackson Memorial Laboratory of Bar Harbor, Maine, stated

The scope of the new attack on cancer can be seen from the subjects planned for study under a score of research panels These include genetics, chemistry and biology of cells, the milk factor, viruses, botany, nutrition, enzymes, proteins, the endocrine glands, the blood and blood forming organs, physics, radiology and radioactive tracer substances

Science News Letter, January 19, 1946

MEDICINE

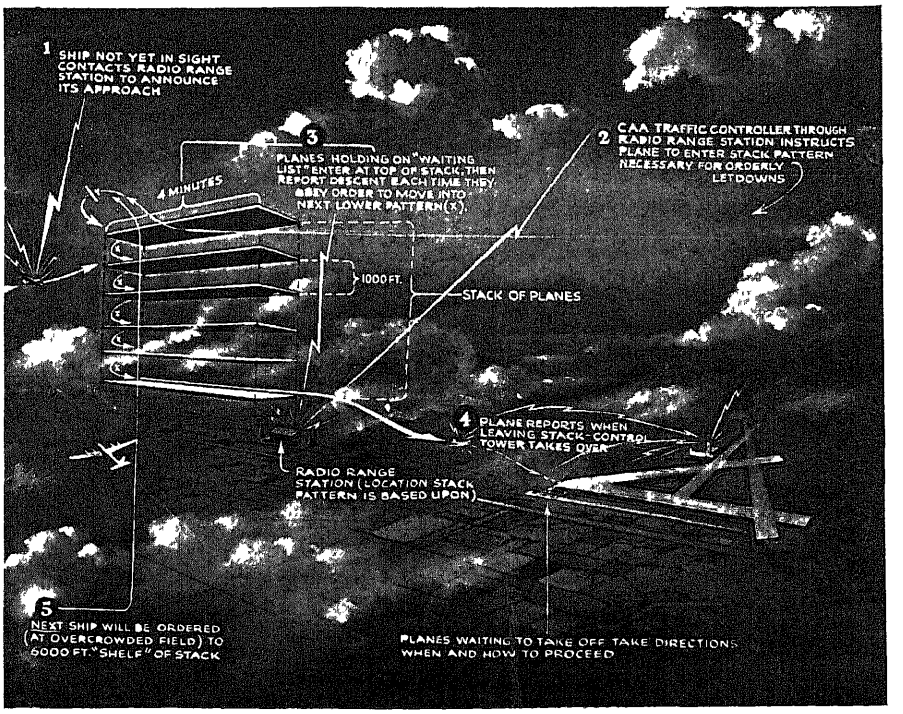
Penicillin Partner Fights T.B., Typhoid

See Front Cover

➤ CRYSTALLINE streptomycin, partner of penicillin, is shown on the front cover of this SCIENCE NEWS LETTER Streptomycin proved effective in controlling tuberculosis in guinea pigs and has had limited suppressive effect on the disease in humans The drug brought recovery from typhoid in three of five cases, suggesting it may bring recoveries and prevent carriers Photograph from Merck & Co, Inc (*See* SNL Sept 29, Dec 22)

Science News Letter, January 19 1946

Dried eggs, developed for war uses, will probably be widely used in making ice cream in the future



"STACKING" PLANES—The technique of "stacking" incoming airplanes at large commercial airports is illustrated by this drawing from the current "Bulletin of the Air Power League." Illustrative of the importance of airport traffic is the fact that some major airports are handling take-offs and landings at an average rate of about one every four minutes.

MEDICINE

Dozen Two-Headed Babies In Medical History

➤ MEDICAL history has recorded only about a dozen cases of babies born alive with two heads in the human family. Such anomalies are known technically as bi-cephalic monsters, and ancient legend relates stories of such cases

Such strange births are probably the result of imperfect division of a single ovum or egg Such accidents are supposedly related to the incidence of Siamese twins, though this theory is not completely established. Among cases recorded not one has ever lived more than a few hours

The two-headed baby girl born in England recently lived only 50 hours. It is reported to have had two heads and two necks joined at a point on the shoulder. It had a single trunk The two heads breathed independently and had differnet pulse rates, indicating the presence of two sets of lungs Because the heads were fed separately, doctors believed it to possess two stomachs. One head was bigger than the other, and a little more active Otherwise they were almost identical

Science News Letter, January 19, 1946

MINERALOGY

Huge Vermiculite Deposit Discovered in Wyoming

➤ A HUGE DEPOSIT, amounting to several million tons, of a little-known but widely-used mineral ore, discovered near Encampment, Wyo., is now being mined and shipped. The ore is vermiculite, used in building insulation and as a replacement for sand in cement and plaster, and this deposit is thought to be the second largest yet opened in the United States

Vermiculite is a non-metallic inorganic mineral with a more or less definite chemical composition that occurs in layers and somewhat resembles mica It has a peculiar property of expansion upon heating, giving off water and spreading perpendicular to its layers, or plane of foliation, up to 16 times its first thickness. It then weighs only six to 10 pounds per cubic foot, and is said to be exfoliated Exfoliation, carried out in a simple furnace, results in a material which contains millions of tiny air cells This accounts for its insulation property

The principal advantages of good vermiculite are that it is fireproof, insulating, vermin-proof and sound-deadening, and has long life When used as a loose fill or as an aggregate with cement or plaster, it provides an excellent fireproof insulation for roof decks and refrigeration plants, and can be used around hot pipes and furnaces.

When used to replace sand in cement and plaster, it has the added value of lightness; the expanded vermiculite weighs about one-tenth as much as sand Vermiculite is mined in Montana, Colorado and North Carolina, as well as in Wyoming The giant Wyoming deposit is being mined by the Alexite Engineering Company of Colorado Springs

Science News Letter, January 19, 1946

BACTERIOLOGY

92-Year-Old Canned Food Found in Good Condition

➤ CANNED FOOD, still good although almost 100 years old, was found in a cache on Dealey island in the Arctic ocean north of Canadian Northwest Territory It was stored there in 1852 by Captain H Kellett of the English ship "Resolute" during his search for the Northwest Passage.

Eight of the cans of food were sent to the laboratories of the Department of Agriculture at Ottawa for chemical and bacteriological tests Some of them contained stewed ox-cheek which was still wholesome, as was shown by feeding it to laboratory animals

Other tests showed that there had been no bacteria in the still-intact cans, and that no chemical preservatives such as borates or nitrates had been used in the food. A can labeled "carrots," on the other hand, was badly corroded and its contents were not recognizable

The discovery, states a publication of the British Tin Research Institute, was made in 1944 by the crew of a Canadian ship, under the command of Sub-Inspector Larson of the Royal Canadian Mounted Police They journeyed from Vancouver to Nova Scotia and back by way of Bering Strait and the Northwest Passage

Members of the crew made many landings during the two long winters when ice-bound in Arctic waters They traveled hundreds of miles over ice by dog sleds. It was on one of these exploratory trips they found the cache, with some of the canned food intact It is unlikely, the Institute says, that the cans remained frozen during the short summer seasons, therefore they were subjected to repeated freezings and thawings and to rusting in the moist air.

Science News Letter, January 19, 1946



MEDICINE

Alkyl Sulfates May Be Stomach Ulcer Remedy

➤ ALKYL SULFATES, the chemicals used in so-called soapless soaps and shampoos, may provide a remedy for stomach ulcers, it appears from studies reported by Drs Harry Shay, S. A Komarov, H Siplet and Samuel S Fels, of the Medical Research Laboratory of the Samuel S Fels Fund in Philadelphia (*Science*, Jan. 11).

The alkyl sulfates, the Philadelphia scientists discovered, act on stomach tissue to cause it to secrete mucus A constantly renewed layer of mucus, it is now believed, is the chief protection of the stomach lining against the destructive action of gastric juice and consequent ulcer formation.

Besides stimulating production of this protective mucus layer, the alkyl sulfates can inactivate pepsin under certain conditions They thus seem to have two-way action as potential stomach ulcer remedies

The effect on mucus secretion lasts for several hours, but depends apparently on the alkyl sulfate being in direct contact with the stomach tissue. The use of the chemical, therefore, will depend on working out methods of giving it which will allow effective action

Science News Letter, January 19, 1946

FORESTRY

DDT Saves Largest Tree In Pacific Northwest

➤ DDT RECENTLY saved a giant fir in Clatsop County, Oregon, believed to be the biggest tree in the Pacific Northwest, from destruction by loopers, which are swarming caterpillars that constitute one of the worst of timber pests. The forest giant has a diameter of more than 15 feet and is claimed to be more than a thousand years old

Rescue of the huge fir was an incident in a general campaign to stop the ravages of the looper in Oregon softwood forests DDT seems to have scored an outstanding success in this fight Counts of dead loopers ran as high as 480 on six square feet of ground beneath the trees

Science News Letter, January 19, 1946

...E FIELDS

AERONAUTICS

Jet-Propelled Plane For Carrier Operation

➤A SPEEDY, fast-climbing, high-flying jet-propelled Navy fighting plane, designed for carrier operation, has been announced. It is the first Navy plane powered by jet engines and designed for use on carriers, and the first Navy fighter to attain a speed over 500 miles an hour It will be known as the FD-1 Phantom

Power for the Phantom is furnished by twin axial-flow Westinghouse turbo-jet engines built into the wing roots The engines, which are of exclusive American design, contain no long scoops or ducts

The plane is built of light aluminum alloy, polished to a glass-like finish, and presents only slight resistance to the air it passes through. It is a single-seat, low-wing monoplane with a wingspan of approximately 40 feet Its wings fold electrically, and when stored the plane is but 16 feet wide

The FD-1 has a service ceiling of well over seven miles, an extremely high rate of climb, and a range of approximately 1,000 miles The plane has now been thoroughly flight-tested, and additional planes will be delivered soon. It was constructed by the McDonnell Aircraft Corporation of St Louis

Science News Letter, January 19, 1946

PHYSICS

Problems to Be Solved Before Atomic Application

➤BEFORE atomic power finds wide applications, there is much development work to be done and many problems to solve, declared Dr. John R Dunning of Columbia University at the meeting of the Society of Automotive Engineers in Detroit But he forecasted the industrial utilization of atomic fuels and energy as future supplementary sources of power

"It seems unlikely that atomic power ever will really replace our common fuels in most applications," he said, but "the new fuel is likely to be a supplement to existing methods. The immediate applications seem to be in the premium fuel field, where the special advantages of atomic power outweigh cost."

Cheaper methods of producing U-235 are in sight, he continued, and fissionable materials other than plutonium, some yet to be discovered, may accommodate large-scale production. Uranium, he said, is as abundant as copper, although uncommon in high-grade ores Industrial applications do not require highly concentrated U-235, he commented, and materials outside the highly explosive range will serve Burning low-grade materials by conversion with U-235, he continued, offers a promise of reducing atomic energy costs below those of coal

Science News Letter, January 19, 1946

CHEMISTRY

Something Really New Added to Smoking Tobacco

➤SOMETHING new really has been added to smoking tobacco—and smokers who have tried it have unanimously expressed a preference for it, even without the ritual of a blindfold test For this simple addition of something that makes tobacco taste better when smoked, three chemists, Dr C F Woodward, Dr Abner Eisner and P G Haines, at the U S Department of Agriculture's regional laboratory at Philadelphia, have received U S patent 2,392,514

Actually the "something new" has been in tobacco smoke all along, though it has never been found in tobacco itself It is an alkaloid known as myosmine, which is said to be responsible for the pleasant aroma of cigar smoke, and which can now be produced synthetically.

The three chemists added microscopic quantities of myosmine to cigarettes, cigars and pipe tobacco, and then invited smokers to compare the treated smokes with similar ones that had no added myosmine. Without exception, the smokers liked the treated tobaccos better

Rights for government use of this discovery have been assigned, royalty-free, to the Secretary of Agriculture

Science News Letter, January 19, 1946

AGRICULTURE

High Buffalo Grass Sought By Agriculture Department

➤BUFFALO grass that bears its seed high enough to be harvested readily is being sought by plant breeders of the U. S. Department of Agriculture Progress is being made, they report, in developing a free-seeding strain needed to reseed areas where buffalo grass is the best grazing plant for the beef animals that succeeded the buffalo herds.

Science News Letter, January 19, 1946

AERONAUTICS

Cornell University Gets Aeronautical Laboratories

➤THE AERONAUTICAL research laboratory and wind tunnel, in Buffalo, built and operated by the Curtiss-Wright Corporation, has been turned over to Cornell University and will be used for the training of graduate students, who will divide their time between the engineering school of the university proper and this laboratory The Buffalo facilities will be supported by a number of leading Eastern aircraft manufacturers

The laboratory, built in 1942, contains the most modern scientific equipment and testing devices known to areonautical research It includes also well-equipped chemistry, physics, hydraulic and electrical laboratories, a model shop and a technical library. Its wind tunnel, however, is its most outstanding equipment

In this wind tunnel scale airplane models can be tested in air velocities in the speed-of-sound range, under varying pressure conditions Also there are miniature wind tunnels where air travels at supersonic speeds, and one of the world's largest altitude chambers, where conditions of pressure, temperature and humidity up to 80,000 feet can be reproduced

Dr C C Furnas, who has headed the laboratory since 1943, will remain to direct its activities for Cornell

Science News Letter, January 19, 1946

CHEMISTRY

Rubber Industry Gets Research Laboratories

➤GROUND has been broken near Brecksville, Ohio, for new research laboratories for the B F Goodrich Company on a 260-acre tract of rolling land almost exactly halfway between Akron and Cleveland. Present plans call for five separate completely air-conditioned buildings made of gray brick The ground-breaking was a part of the celebration observing the 75th anniversary of the founding of the company

This building site was selected because of its freedom from dust, cross-country electric lines, vibration and noise. It will permit delicate operations that cannot be carried on close to industrial or manufacturing operations. The new plant will replace research laboratories in Akron, where the company's first laboratory was established in 1895.

Science News Letter, January 19, 1946

MEDICINE

Influenza Protection

Three out of four saved from influenza by vaccine made from virus grown on fertile hen eggs. It is effective against types A and B "flu."

By JANE STAFFORD

➤ TODAY, 27 years after the great influenza pandemic at the close of the first World War, medicine can do something about this disease

To the old, never too popular advice —"Avoid crowds, keep yourself well fed and well rested to escape influenza"—can now be added, "See your doctor for a shot of vaccine that gives 75% protection against two types of the disease."

For the often-killing pneumonia and other infections that followed influenza in many of the 1918-19 cases, your doctor today can say, "It's only pneumonia," or "Only a strep infection," and get you on your feet again in a short time with a course of sulfa drug or penicillin treatment

The vaccine, getting its first big test in the 1945-46 epidemic, might not have done any good in 1918 even if it had been developed It is made from and effective against two types of influenza virus, A and B. What type caused the 1918 pandemic is not known At that time some scientists thought the cause was a virus but others believed it was one of a number of slightly larger germs, bacteria, among them one called Hemophilus influenzae

"Types" Discovered

More than a decade ago, however, Drs. W Smith, C. H Andrewes and P Laidlaw, of the English National Institute for Medical Research, discovered influenza A virus, one of the two against which a protective vaccine is now available In 1940 two American scientists, Drs. T P Magill and Thomas Francis, Jr., independently discovered type B influenza virus, the other one against which the protective vaccine is effective

Types A and B influenza viruses are believed to be the ones that cause epidemics of influenza such as have occurred every few years since 1918 Other types probably exist but have not yet been identified. Type A is thought to have caused the epidemics in the odd-numbered years since 1933. Type B occurred in the two even-numbered years, 1936 and 1940 It got off its even-year cycle, however, causing a number of outbreaks in Army camps in the spring of 1945 and a sizable nation-wide epidemic in the winter of 1945-46.

Efforts to develop a vaccine against influenza have been continuing ever since the discovery of the A virus in 1933 In that same year, Prof E. W Goodpasture and associates, Drs G J Buddingh and A M Woodruff, of Vanderbilt University, announced they had successfully vaccinated 11 persons against smallpox with a vaccine made from smallpox virus grown on fertile hen eggs

"Daddy" Vaccine

You may wonder what smallpox has to do with influenza The smallpox vaccine, however, was in a way the Daddy of the new vaccines against influenza, typhus fever, yellow fever and Rocky Mountain spotted fever Typhus, 'flu, yellow fever, and smallpox are caused by germs of the virus class

Rocky Mountain spotted fever is caused by rickettsia, a different type of disease germ but one which is closer to the viruses than to the bacteria such as streptococci, staphylococci and diphtheria bacilli Viruses, unlike the larger bacteria, cannot be cultivated outside of living susceptible cells This makes the study of them and development of vaccines to protect against them much more difficult, since it requires the use of living animals instead of chemical culture media

When Dr Laidlaw and associates succeeded in isolating influenza A virus, they immediately started to try to develop a vaccine from it First they injected ferrets with influenza virus from human patients Then virus-containing material from the ferrets was injected into horses Blood serum from these hyperimmunized horses was then used as a vaccine for tests on laboratory mice The vaccine did succeed in protecting the mice against influenza virus

The discovery that viruses could be grown on the chick embryo in fertile hen eggs gave scientists a powerful weapon for the war on virus diseases As early as 1939 Prof Goodpasture predicted that a vaccine for influenza and solution of other virus disease problems would come from this discovery In fact, an Australian scientist, Dr F M Burnet, had already taken the first steps in that direction

He had cultivated influenza virus on successive chick embryos until it lost its disease-producing power to such an extent that it did not cause sickness when dropped into the nose At the same time, it increased the level of the body's own flu-fighting forces, called antibodies, in about one-half of those tested

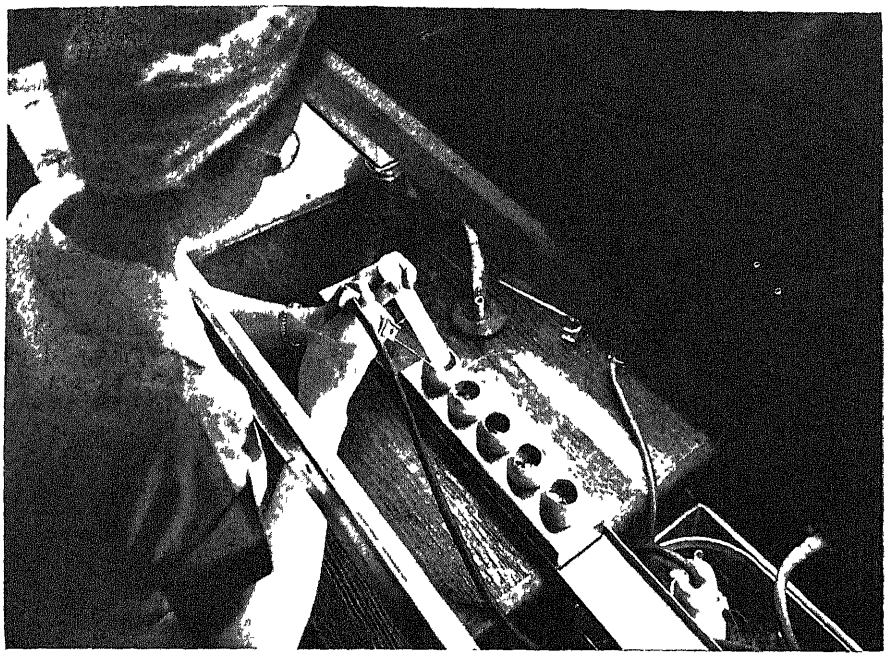
Efforts to develop a satisfactory influenza vaccine, continued by many scientists over the years since 1933, culminated, in 1943, with trials by the Army's Commission on Influenza of a concentrated inactivated vaccine prepared from the virus of influenza types A and B

About 12,500 men in nine groups of Army Specialized Training Program units stationed in different parts of the United States were the human guinea pigs for this trial Half the men in each group were vaccinated, the other half remaining unvaccinated for comparison When influenza broke out that year, the Army had a good opportunity to evaluate the protective value of the new vaccine Whereas 2.22% of the vaccinated came down with 'flu, almost three times as many, 7.11%, of the unvaccinated had influenza The vaccine was therefore judged to be 75% effective, and to reduce the severity of the illness in those who were not completely protected.

Vaccination Ordered

Memories of the frightful influenza toll in Army camps during the 1918 pandemic haunted the Army's medical department all through World War II When outbreaks of influenza began occurring in Army camps in the spring of 1945, suggesting that a big epidemic might be brewing for the following fall and winter, it was decided to take no chances on an unprotected Army Orders were given for vaccination of all Army personnel in October and November.

The results of this mass vaccination procedure may show whether all of us will be justified in getting vaccinated against 'flu each fall.



FLU FIGHTER—Here a laboratory technician removes the virus-laden fluids from partially incubated chick eggs by suction in the laboratories of Pitman-Moore Co. This firm and Sharp and Dohme, Lederle, Squibb, Lilly and Parke-Davis manufactured vaccine for the Army and are now producing it for civilian use.

Disinfecting the air in public buildings and even homes with ultraviolet light or with invisible mists of germ-killing chemicals may be added to vaccination as a means of protection against influenza While going to the doctor for a "shot" of vaccine would be simpler, the air disinfection method has the advantage of giving protection against other diseases than influenza

Still needed in the almost Thirty Years War against influenza is a chemical remedy like the sulfa drugs or an antibiotic like penicillin for treatment of patients If the virus of the 1918 pandemic is ever again loosed on the world, the present vaccine probably would not be effective The vaccine is specific for only two known influenza viruses Sulfa drugs and penicillin and streptomycin, on the other hand, are effective against various strains or types of streptococci. A remedy effective in one influenza virus type might therefore be expected to remedy infection with any type of 'flu virus

Science News Letter, January 19, 1946

ELECTRONICS

Aerial Counterspies

Special electronically equipped aircraft known as Ferrets hunted out enemy secret radar installations for Allied jamming or destruction.

➤ SPECIAL AIRCRAFT, known as "Ferrets", packed full of electronic equipment, served during the war as aerial counterspies in ferreting out the enemy's most closely guarded radar secrets Details of their equipment and activities were revealed by Headquarters, Air Technical Service Command.

Flying over enemy territory, these special radar countermeasures laboratories sought out enemy radar stations and analyzed their signals to determine what radar devices could later be used to make them ineffective by jamming. In other cases, the sites of the enemy radar were located and later the installations were bombed out of existence. If enemy stations were difficult to reach, information was obtained relative to their blind spots, so that Allied craft could approach enemy territory with lessened danger of detection

The Ferret carried equipment which not only received and recorded enemy radar signals but analyzed them for rate, size and shape of pulse, determined their frequency, and established the geographic location of the radar Some 15 different electronic devices were carried by them, included with their special equipment that weighed about a ton

Twenty-three Ferrets were in use at the end of the war The first saw duty in January, 1943, when it flew a mission in the Aleutians to locate Japanese radars and determine the zone of their coverage Only one was located, and it was found that certain areas were protected from its beams It was in these areas that future aerial raids made approaches to the islands, surprising the Japs every time

Two other Ferrets, outfitted in the spring of 1943, were used in the Mediterranean area in preparation for the Sicilian invasion in July Enemy radars were located and effectively jammed by countermeasures devices This was the first time that jamming was used in a major military operation The production of Ferrets followed rapidly the successes of these two and they played an important role in both the European and the Pacific war zones

Science News Letter, January 19, 1946

PHYSICS

Electrical Computer Solves Equations

➤ AN ELECTRICAL method of solving some mathematical equations that is four to seven times faster than conventional methods was announced to the American Physical Society in Los Angeles by Dr. Clifford E Berry of the Consolidated Engineering Corporation of Pasadena, Calif.

The new computer used for solving linear simultaneous equations consists of an electrical circuit containing pairs of potentiometers As those who have studied advanced mathematics know, the usual method of solving such equations involve a laborious cut-and-try method of assuming values and solving for one unknown and then for others In the electrical method of solving the equations, different voltages are used to perform the necessary operations, and the computer used does not introduce significant errors.

Science News Letter, January 19, 1946

Do You Know?

Hawaii held its *sugar* output at near normal levels during the war.

A railroad car *axle unit,* including the two attached wheels, weighs over a ton

Dried herbs hold their flavor better if freed of stems and stored in air-tight containers

A *jet engine* that burns wood, apparently compressed sawdust, is described in a captured German document, it is reported

One species of *rattlesnake* in the jungles of the American tropics is apparently losing its rattle, as this structure is reduced in size and is frequently not sounded

Pure manganese, produced electrolytically from low-grade domestic ores, has advantages as a substitute for low-carbon ferromanganese in making stainless steel, the U. S Bureau of Mines says

Food storage technicians from several countries of the Western Hemisphere are conducting experiments in Venezuela to fit methods developed in the United States for use in the warmer countries

Perlite, a glassy volcanic rock common in the Southwest, expands up to ten times its volume when heated in a rotary kiln at 2,000 degrees Fahrenheit, forming a cheap, fire-resistant insulation material

With increased American acreage in *soybeans,* the discovery of a brand-new soybean disease in Illinois is important. It is called brown stem rot because the interior of the lowest part of the stem is usually colored brown

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BOTANY

NATURE RAMBLINGS by Frank Thone



Taking Cover

➤ SOME OF our commonest weeds learned long ago the first hard lesson that has to be taught to every recruit during his basic training

After the rookie has learned the difference between his right foot and his left, and had it hammered into him that he *must* keep the muzzle of his rifle out of the dirt, he may be given his first run over a simulated-combat course The first thing he learns there is that at the first rattle of fire from the other side he must take cover—flatten himself down like a horned toad, until he can hide behind a clump of grass no higher than a hat If he learns well to keep the head down (not to mention other parts of his anatomy) he will stand a good chance of survival if he ever has to face the hazards of battle, otherwise, woe betide him!

A great group of plants, vastly diverse in botanical kinships, have learned the lesson of taking cover in the face of the deadly fusillades of snow and sleet and cold, drying wind that winter aims at any living thing that lingers out-of-doors when the really severe storms begin These are the so-called rosette plants—dandelion, mullein, wild lettuce, thistle, harebell, ladies'-tobacco, saxifrage, hawkweed, and dozens of others—recognized as belonging to the same ecologic company by the way they flatten their symmetrical circles of leaves against the soil They can make a breastworks of the lowest stubble, hide under a few dead leaves. They make an ally of the snow itself: as soon as it is a half-inch deep they are well protected against further assaults of cold and winter drought.

The great majority of rosette plants are classified as biennials or short-lived perennials They get their start from seed during late spring or summer and by the end of the growing season they have their whorl of leaves well formed, close pressed against the ground, ready for what winter may bring. When spring comes and the snow melts off, they do not have to bother about unfolding leaves from buds or striking roots from seeds There they are, leaves all ready for business, full of chlorophyll and displayed at maximum spread to catch the first warm rays of the sun

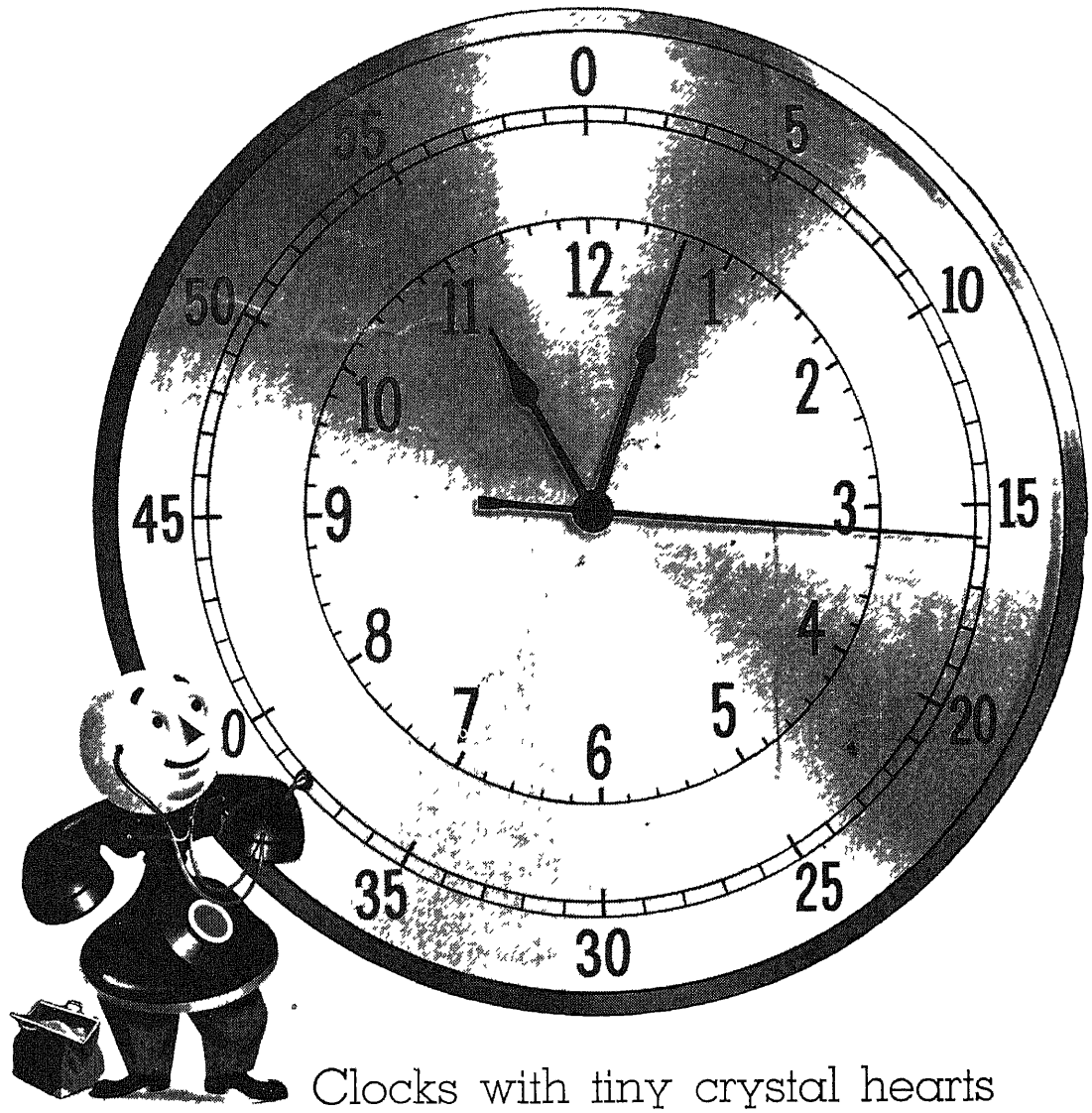
Most rosette plants, when they are ready to convert the reserve stocks of food in their thick taproots into the structures and energy needed for seed formation, send up tall leafy stalks Mullein, thistle, wild lettuce, hawkweed, all do this. Dandelion is more conservative, it utilizes a minimum of material in sending up its naked flowerscapes and keeps all its foliage well marshalled in a persistent rosette. And (to the woe of the greens committee and the lawn owner) it lives to fight another day

Science News Letter, January 19, 1946

If *leaf rust* destroys all wheat leaves at blossoming time the crop loss is approximately 34%, it is estimated.

Wood flour is finely ground sawdust; in addition to other uses it is employed as an absorbent in the manufacture of dynamite, permitting the explosive to be transported and handled with a minimum of danger.

FIGHT INFANTILE PARALYSIS
MARCH OF DIMES
JANUARY 14-31



Clocks with tiny crystal hearts that beat 100,000 times a second

CRYSTAL HEARTS beat time in Bell Telephone Laboratories, and serve as standards in its electronics research. Four crystal clocks, without pendulums or escapements, throb their successive cycles without varying by as much as a second a year.

Precise time measurements may seem a far cry from Bell System telephone research, but time is a measure of frequency, and frequency is the foundation of communication whether by land lines, cable, radio.

These clocks are electronic devices developed by Bell Laboratories, and refined over years of research. Their energy is supplied through vacuum tubes, but the accurate timing, the controlling heart of the clock, is provided by a quartz crystal plate about the size of a postage stamp.

These crystal plates vibrate 100,000 times a second, but their contraction and expansion is less than a hundred-thousandth of an inch. They are in sealed boxes to avoid any variation in pressure, and their temperatures are controlled to a limit as small as a hundredth of a degree.

Bell Laboratories was one of the first to explore the possibilities of quartz in electrical communication, and its researches over many years enabled it to meet the need for precise crystals when war came. The same character of research is helping to bring ever better and more economical telephone service to the American people.

BELL TELEPHONE LABORATORIES *Exploring and inventing, devising and perfecting for continued improvements and economies in telephone service.*

GEOLOGY

Carolina "Bays" Dated

Studies of fossil bog pollen in the great elliptical depressions in the coastal plain indicate they originated during later phases of Ice Age.

➤ THE CAROLINAS' mysterious "bays", great elliptical depressions in the sandy coastal plain now mostly filled with bog deposits, originated during the later phases of the last great Ice Age, studies of fossil pollen carried on by Prof. Murray F Buell of North Carolina State College indicate (*Science*, Jan. 4)

Prof Buell collected samples of soil from one of the bays, known as Jerome bog, taking them at six-inch intervals from the surface down through seven feet of peat and two feet of underlying clay, to the sandy soil at the bottom. Pollen grains preserved in the ancient soils were identified and counted

Pollens from the lowermost samplings represented such trees as black-gum, native to the region today, indicating a climate not unlike that of the present when the depression was first formed. Above this, in the bottom clay, fir pollen is predominant, together with oak and hickory This is the kind of forest now found in northern Minnesota, where the typical mixed hardwood forest of the United States meets the southern-most extension of the Canadian evergreen forest Nearest firs to the "bays" now grow on the tops of the Southern Appalachians, with the mixed hardwoods stopping at lower levels.

It is estimated that a mixed hardwood-and-conifer forest must have developed in the Carolinas area during the Wisconsin period, which was the last great southward advance of the continental glaciers during the Pleistocene Ice Age.

The Carolina "bays", which have nothing to do with bays in the ordinary sense of the word, have been the subject of much scientific controversy One group of geologists believe they were produced by the impacts of giant meteorites in a single catastrophic shower Opponents claim origins from less spectacular causes, such as eddying coastal currents, outbreaks of great artesian springs and the collapse of subterranean caves producing surface depressions and sink-holes. Prof. Buell points out that if the first hypothesis is correct, the Ice Age date determined for the Jerome bog should hold for all the bays, if not, the age is valid for this bog only, ages of others will need to be determined by separate studies

Science News Letter, January 19, 1946

GEOLOGY

Americans Must Become Foreign-Mineral-Minded

➤ AMERICANS must become foreign-mineral-minded in the future and cooperate with foreign government agencies in appraising foreign ore reserves that may some day be needed in the United States This is the opinion of Dr Alan M. Bateman, professor of economic geology at Yale University, expressed at a recent meeting of the Geological Society of America He gave as a reason the problems faced during the war, of getting enough minerals to keep our industries in operation

Dr Bateman stated that he thought American mining companies should, with government cooperation, go into foreign mining of tin, manganese and chrome, in ventures that would afford protection to capital and benefits to the foreign countries.

He declared, "Without the security of return of capital, no capital will be invested in foreign ventures, and without the assurance of benefits to the owning country, no investments will be permitted"

It is Dr Bateman's opinion that the State Department has an opportunity of leadership in establishing foreign relationships conducive to foreign mineral developments for Americans, and that geologists have a real job ahead of them for the future

Science News Letter, January 19, 1946

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• Books of the Week •

ARTIFICIAL RESPIRATION EXPLAINED—Frank C Eve—*E & S Livingstone*, 76 p, illus, 3s New and improved methods of artificial respiration simply explained and fully illustrated

AUTOMATIC WEAPONS OF THE WORLD—M. M Johnson, Jr and Charles T Haven—*Morrow*, illus and diagr, $7 50 Describes military automatic arms that were used by both Axis and United Nations in World War II, early and experimental automatic weapons of all types from 1885 to 1945, and sporting automatic rifles, shotguns and pocket pistols in use up to the present time

BETTER HEALTH FOR RURAL AMERICA, Plans of Action for Farm Communities—United States Dept of Agriculture, Interbureau Committee of Post-War Programs, *Government Printing Office*, 34 p, illus, 20 cents A survey of the facts about rural health and medical care, of what has been done in the past and what should be done now

ELECTRONIC NAVIGATIONAL AIDS—U S Coast Guard—*Government Printing Office*, 48 p, illus and diagr, free Non-technical, summary information about Loran, Radar, and Racon as applied for commercial use

GLYCERIN Its Industrial and Commercial Applications—Georgia Leffingwell and Milton A. Lesser—*Chemical Publishing Co*, 259 p, diagrams, $5 Will provide chemists, manufacturers, salesmen and industrial workers with useful hints as to the utilization of glycerin in their products and the formulation of new products

GUIDANCE Personal and Vocational—Lili Heimers and Margaret G Cook, *New Jersey State Teachers College*, 40 p, 75 cents A bibliography of charts and posters, films and filmslides, pictures, publications, recordings and transcriptions for use in guidance in the schools.

HIGHER EDUCATION LOOKS AHEAD—Ernest V Hollis and Ralph M Flynt, *Government Printing Office*, 98 p, 20 cents. Compilation of reports from American Colleges and Universities on their postwar plans U S Office of Education, Bull 1945, No 8

NATIONAL SCIENCE FOUNDATION—Senate *Committee on Military Affairs*—29 p, free Text of Senate Bill 1720, introduced by Senators Kilgore, Johnson, Pepper, Fulbright and Saltonstall, to promote the progress of science and secure national defense Copies may be obtained by writing to Senator Kilgore

NUTRITIVE PROPERTIES OF PORK PROTEIN AND ITS SUPPLEMENTAL VALUE FOR BREAD PROTEIN—U S Department of Agriculture—*Government Printing Office*, 12 p, tables, 5 cents Report of experiments to determine the digestibility and growth-promoting values of the protein in different dehydrated roasted cuts of fresh pork

THE PAN AMERICAN YEARBOOK 1945—*Pan American Associates*, 829 p, maps and illus, $5 An economic handbook and ready reference directory of the western hemisphere, including a special industries section.

THE PSYCHOANALYTIC THEORY OF NEUROSES—Otto Fenichel, M D, *Norton*, 703 p, $7 50 Giving a comprehensive treatment of the psychoanalytic doctrines as well as the wealth of clinical data contained in the author's previous books

SCIENCE LEGISLATION Analytic Summary of Testimony—*Senate Committee on Military Affairs*, table, 138 p, free An analysis of the testimony of 100 scientists and other experts given to the Subcommittee on War Mobilization of the Senate Committee on Military Affairs regarding the Kilgore and Magnuson bills providing for the promotion of science Copies may be obtained by writing to Senator Kilgore

TABLES OF FOOD COMPOSITION In Terms of Eleven Nutrients—Bureau of Human Nutrition and Home Economics, U S Dept of Agriculture—*Government Printing Office*, 30 p, tables, free Gives average values for food energy, protein, fat, carbohydrate, three minerals, and the better known vitamins for foods most commonly used in the U S. and some of the less common foods

TELEVISION The Eyes of Tomorrow—William C Eddy—*Prentice-Hall*, 330 p, illus and diagr, $3 75 Up-to-date, non-technical account of television in all its aspects—from basic principles of operation to how to stage a full-scale broadcast

CHEMISTRY

Phosphor Investigation Determines How They Work

➤ THE RAPIDLY growing use of fluorescent lamps, in which invisible rays are made over into visible light by the use of substances called phosphors, has led to intensive laboratory studies of what are good and what are bad phosphors, with satisfactory results announced Dr Rudolph Nagy, Westinghouse Lamp Division research chemist, is in charge of the study

An efficient phosphor, he points out, is made up of molecules and atoms circled by electrons that whirl around it like tiny satellites Atoms within each molecule resonate like a violin spring or a musical tuning-fork and are in constant vibration, he says

"The frequency of resonance," which is the flow of energy back and forth throughout the crystal, determines the ability of the phosphor to absorb ultraviolet radiation inside the fluorescent lamp tube and to emit light in the desired part of the spectrum," he explained.

Conjugation, or pairing of the atoms within each molecule, is the only known method by which this resonance can occur over lengthy microscopic spaces within the crystal, he continued Hence only those substances qualified by proper natural resonating atomic structures are capable of being an efficient phosphor

The best phosphors found to date, according to Dr Nagy, are zinc beryllium silicate, magnesium tungstate, calcium tungstate and cadmium borate.

Science News Letter, January 19, 1946

ASTRONOMY

Meteorites Drawn to Electromagnetic Cane

➤ AMATEUR meteorite-hunters can be saved many a backache from stooping over unnecessarily by using an electromagnetic cane described by Dr Lincoln La Paz, president of the Society for Research on Meteorites

The cane consists of a small coil of enameled wire wound on a brass tube that can be slid up and down on a light, but strong iron rod The electromagnet is connected to a battery carried in a knapsack When connected with a six-volt battery, the cane readily picked up an Odessa iron meteorite weighing more than a pound, and caused "smaller fragments to jump an inch or more to the collecting tip," Dr La Paz reports in *Popular Astronomy*

Science News Letter, January 19, 1946



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Science News Letter, January 19, 1946

⚙ *COMBINATION plow to turn surface soil and loosen subsoil has additional small plows set a few inches below and behind the base of the regular or surface-turning implement. These crumble what farmers call the plowpan, or hard undersoil left untouched by the ordinary plow.*

Science News Letter, January 19, 1946

⚙ *ROTARY knife, for cutting seed potatoes, after each cut passes through a bath of boiling water. The purpose of the sterilization is to control ring rot, a bacterial disease of potatoes often spread by a contaminated blade.*

Science News Letter, January 19, 1946

⚙ *ELECTRIC fingernail file consists of a casing small enough to fit into the palm of the hand, in which is held a tiny electric motor with a grinding wheel on the forward end of the shaft. A depression and opening over the wheel lets the nail be placed against the revolving surface.*

Science News Letter, January 19, 1946

⚙ *GUNSIGHT which projects an illusionary but definite bull's-eye pattern into the sky around the target, is mounted on a modern shotgun in the position shown in the picture. The hunter, in aiming, glances through the gunsight's reflector plate to see that the projected ring and dot are on the target.*

Science News Letter, January 19, 1946



⚙ *NOVELTY savings bank has a frame for holding a photograph on its front side. Coins are slipped into the bank through a slot in the top behind the frame, through which, also, a special hook may be inserted to raise a lever to open the bank.*

Science News Letter, January 19, 1946

⚙ *DRILL-SHARPENING device is a simple stand that holds a drill in an upright position with its cutting edge slightly above the sloping top surface of the head of the stand. The slope is at the angle to which the cutting edge is to be sharpened, and guides the file or whetstone sharpener.*

Science News Letter, January 19, 1946

⚙ *FAN ATTACHMENT for plows, recently patented, is claimed to keep the farmer cool while plowing. Fastened on the plow handles at its upper end it has a small rotary fan driven by a belt from a tractor wheel rolling on the ground under the handles.*

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Question Box

CHEMISTRY

What new substance has been added to smoking tobacco? p. 41

What process has proved most successful in the synthesis of vitamin A? p. 35

ELECTRONICS

What are Ferrets? p. 43

What two cities are now connected by coaxial cable? p. 36

GEOLOGY

What has enabled geologists to date the mysterious "bays" of the Carolinas? p. 46.

MEDICINE

How rare is the occurrence of two-headed babies? p. 40

How was flu research used as a "blind" during the war? p. 37

To what new use may alkyl sulfates be put? p. 40

What new treatment is saving wood alcohol poisoning victims? p. 35

MINERALOGY

Where is the new vermiculite deposit located? p. 40

PHYSICS

How can electricity solve mathematical equations? p. 43

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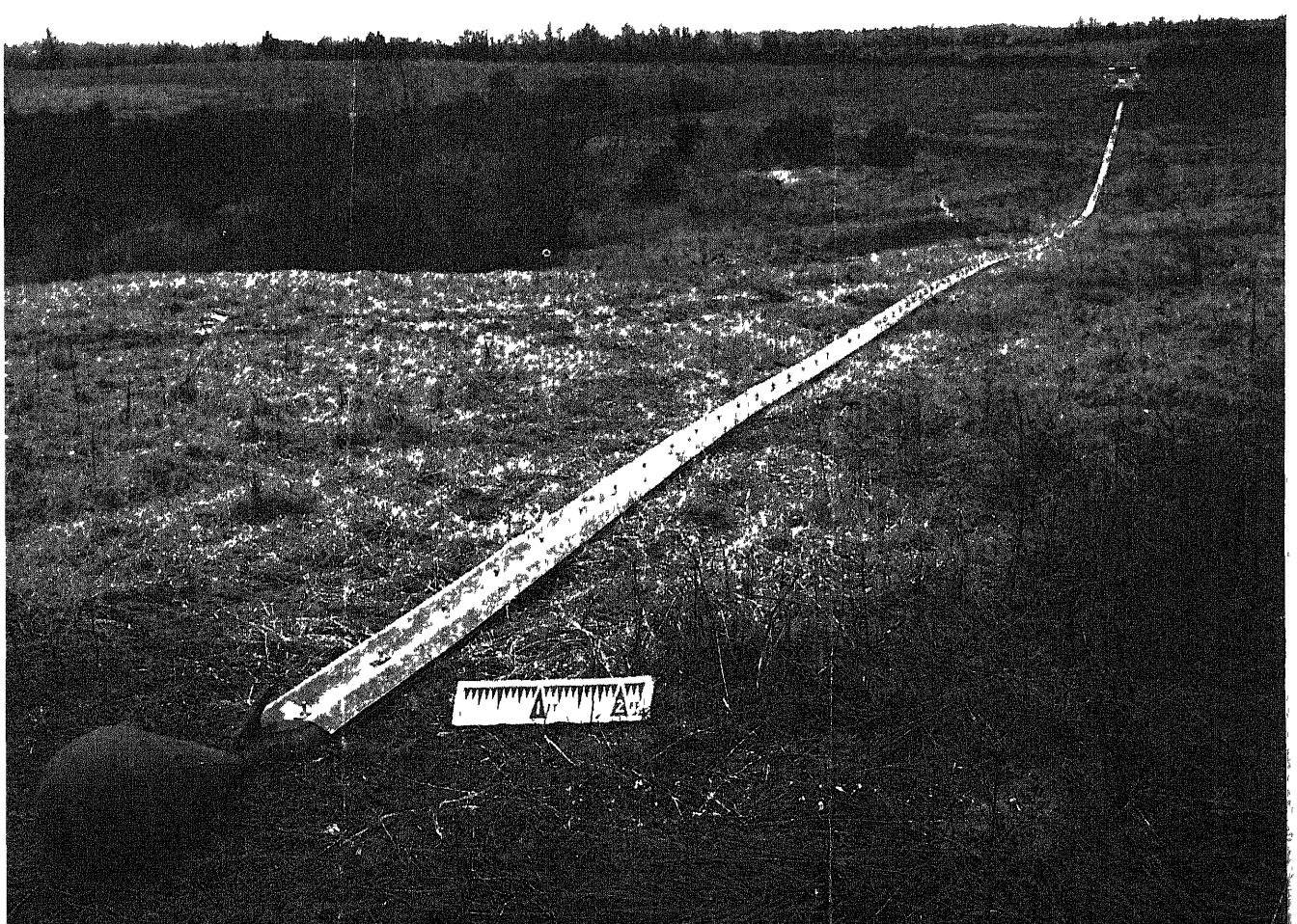
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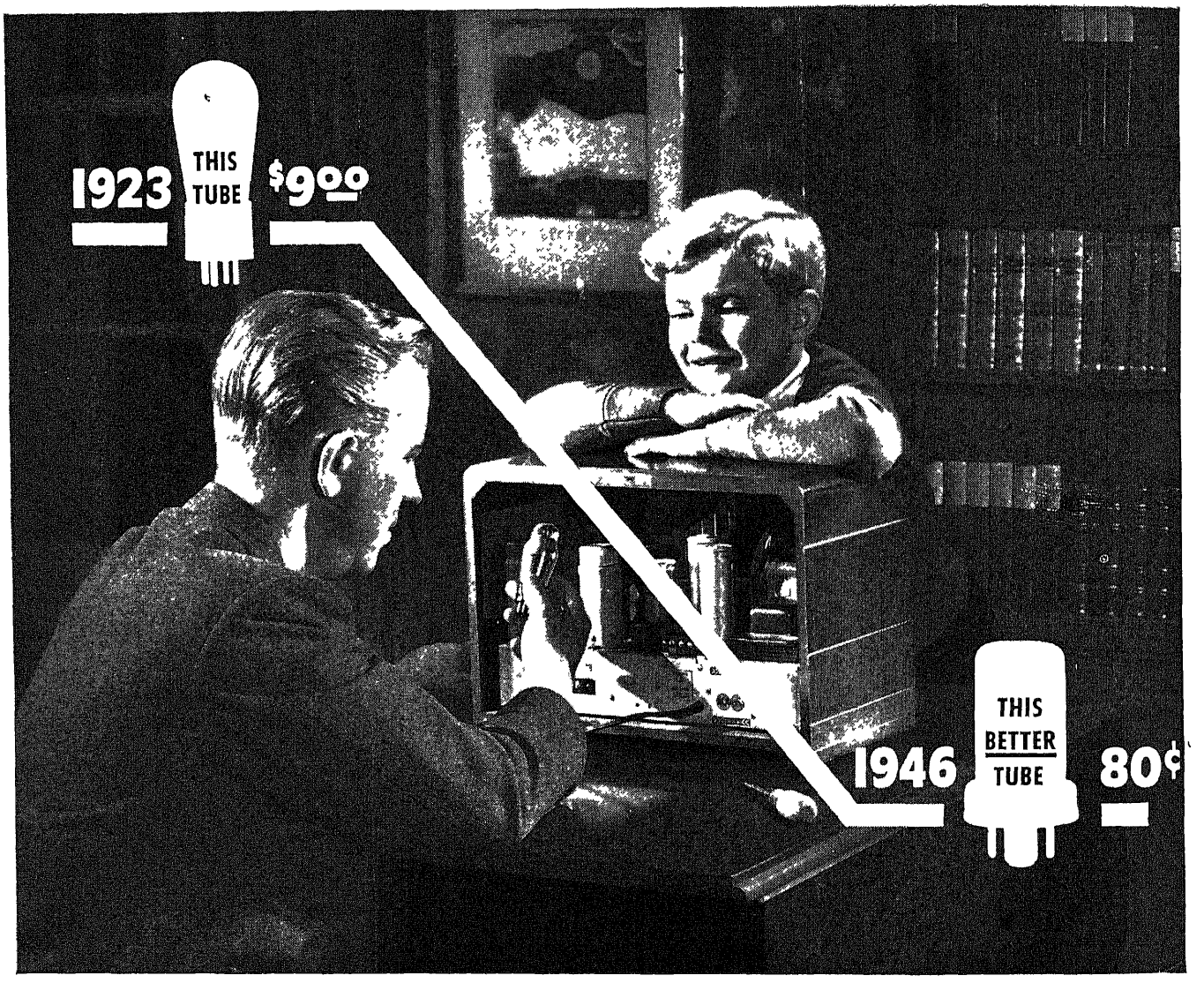
THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 26, 1946



The "Snake"

See Page 52

A SCIENCE SERVICE PUBLICATION



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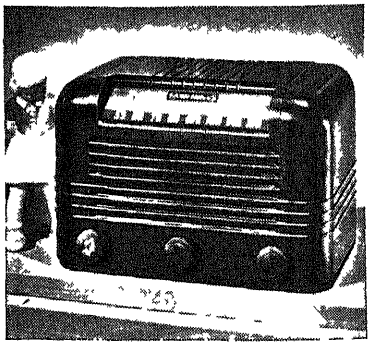
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The new 1946 RCA Victor Table Model (56X) costing about $25. With our civilian production increasing, you can again look to RCA for the finest instruments of their kind that science has yet achieved The principle of making it better—for less—applies to RCA Victor radios, television sets, Victrola radio-phonographs every product bearing the RCA label

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EMBRYOLOGY-GENETICS

Unborn Mice Have Young

Transplantation experiment is expected to aid medical research, including cancer search. Could be repeated for any number of successive generations.

➤ UNBORN female mice, that never lived to see the light of day, have nevertheless become the mothers of new broods of mice, in a unique group of experiments performed by Dr W L Russell and Patricia M Douglass at the Roscoe B Jackson Memorial Laboratory in Bar Harbor, Maine, and reported in the *Proceedings* of the National Academy of Sciences The new transplantation method is expected to aid medical research, especially on hereditary factors in cancer

The dead embryo mice were enabled to produce living offspring through the transplantation of their still-immature ovaries into the bodies of other female mice, whose ovaries had just been removed The transplanted organs were accepted by the bodies of the foster-mothers and in a relatively short time were in reproductive condition When the foster-mother mice were mated they produced litters of young, in normal fashion

To make sure that the new mice really developed from eggs produced by the transplanted ovaries, two strongly contrasting genetic strains of mice were used in the experiment, giving easily detected differences in color and coat character between the "donor" embryos and the "host" foster-mothers The offspring plainly showed their kinship to the strain to which the sacrificed embryos had belonged

Dr Russell and Miss Douglass point out several ways in which their work may yield scientifically valuable results It should produce data of value in deciding relative importance of heredity and maternal environment, and also give opportunities to study the effects of hormones, or internal gland secretions, in prenatal development

Finally, the experimenters point out, "There is no reason to suppose that the method could not be repeated for any number of successive generations, thus leading to an indefinite number of unborn direct female ancestors This possibility should be of interest to investigators in several fields of research In studies of the mammary tumor agent, for example, mice could be obtained whose female ancestors, for any number of generations, had not been nursed"

Science News Letter, January 26, 1946

MEDICINE-CHEMISTRY

Protects Penicillin

Phenol compound helps the drug do a better job in fighting germs in infected wounds. Can also be used as a liquid or as an ointment on dressings.

➤ PENICILLIN can do a better job of fighting germs in infected wounds when it is protected by a chemical related to carbolic acid, it appears from a report by Dr Frank L Meleney, Miss Balbina A Johnson and Miss Frances Colonna of New York and Capt Edwin J Pulaski, of the Army Medical Corps. (*Journal, American Medical Association,* Jan 19)

Surprising as it may be to those who have looked on the mold chemical as almost a cure-all for germ diseases, penicillin is powerless against some germs and its anti-germ power is destroyed by substances these germs produce

Wounds on the battlefield or in peacetime accidents may become infected with these penicillin destroyers and at the same time with germs that are ordinarily susceptible to penicillin The problem for the surgeon is to determine which germs are present and, if there are penicillin destroyers, to get rid of them so the penicillin can act on the others If this is not done, and penicillin is used in the wound in ordinary amounts, there is the danger that germs ordinarily susceptible to penicillin will develop penicillin resistance because the amount of penicillin in the wound will be reduced by penicillin destroyers below the level needed to destroy susceptible germs

In a search for a way to overcome this situation, the scientists tested over 200 chemicals and antibiotic agents for their ability to destroy the germs that destroy penicillin The carbolic acid relative, parachlorophenol, was the most effective of the antiseptics tested It does not injure the tissues or cause toxic symptoms, can be used with penicillin and can be used as a liquid or as an ointment on gauze dressings

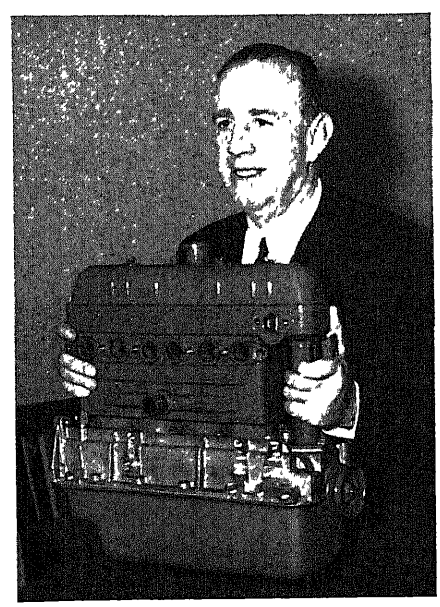
Results of tests of other substances, the scientists state, will be reported later

Science News Letter, January 26, 1946

ENGINEERING

26 Horsepower Engine Built on New Principle

➤ A NEW 26-HORSEPOWER engine for light automobiles, built on a radically new principle from thin sheet-steel stampings instead of heavy forgings and castings and weighing only 59 pounds, has been announced by Crosley Motors, Inc It is low in first cost, economical to operate, and can drive the new 1000-pound Crosley car at a top speed of 60 miles an hour At a 35-mile speed it can operate 50 miles on one gallon of gas



COMPACT ENGINE—The new 26-horsepower Crosley engine is built on a radically new principle from thin sheet-steel stampings and weighs only 59 pounds. Holding the engine easily on his lap is Powel Crosley, Jr., president of Crosley Motors, Inc.

The cylinder walls of the new engine are of chrom-molybdenum steel, and are only one-sixteenth of an inch thick. The engine parts are all stamped from thin metal sheet and tubes crimped together, then braced into a single piece by melting pure copper into all the joints by an hour's baking in a hydrogen or gas furnace. The entire engine is thus precision-formed, machined to exact dimensions and is ready to go to work Its cost is a small fraction of that of a standard engine, it is claimed

The low fuel consumption of the new engine, the makers state, is a direct result of the thin walls which permit efficient cooling of the cylinders. It operates at the high speed of 5,000 revolutions a minute Its four cylinders are only two and one-half inches in diameter with a two-and-a-quarter inch stroke The pistons are cast of aluminum alloy and the crankcase is an aluminum casting The cooling system holds but five quarts of water, but the pump forces 12 gallons of water through the system every minute

Science News Letter, January 26, 1946

ELECTRONICS

Throat Microphone

Highly sensitive to throat vibrations and insensitive to sound waves in the air, it is particularly suitable for use in noisy surroundings.

➤ THROAT MICROPHONES, that reproduce speech by picking up the vibrations of the larynx instead of sound waves from the mouth, are particularly suitable for use in machine shops, airplanes, warships and other places with noisy surroundings, members of the American Institute of Electrical Engineers were told by L. G Pacent of the Pacent Engineering Corporation and E H Greibach of the Sonotone Corporation

The throat microphone is a discriminating type of microphone, they said, because it is highly sensitive to vibrations transmitted to it by bodily contact with the sound-producing throat, but is quite insensitive to sound waves transmitted by air. It is comfortable to wear, does not shift out of position, and permits normal conversation to be carried on unrestricted to a degree not approached by any other form of microphone, they declared

Throat microphones can be built on different principles, it was explained, according to the method used for the conversion of acoustic into electrical energy, such as carbon chambers, crystal microphones, and electromagnetic systems. Of these three kinds of elements, the scientists stated, the electromagnetic system is especially well suited to provide a high-articulation throat microphone

The paper presented by Mr. Pacent and Mr. Greibach dealt technically with the theory and design of magnetic inertia throat microphones Especial attention was given to the treatment of sound power and high-articulation throat instruments. Because they operate while pressed against the human body, it is necessary to enclose their working mechanism within a rigid housing to prevent external forces from affecting the air gap For the same reason, they said, it also becomes desirable to use the inertia principle in the design of such microphones

Testing Bone Receivers

At the same meeting Mr Greibach explained laboratory methods for the objective testing of bone receivers and throat microphones The problem of building an artificial ear, he said, is relatively simple compared with that of constructing an "artificial mastoid" for testing bone conduction receivers, or an "artificial throat" for testing throat microphones

The artificial throat must have a vibrating platform capable of imparting a velocity to a throat microphone through a filter simulating the layer of skin The platform must be large enough, he stated, to make the microphone response independent of small changes of position of the microphone on its surface

Science News Letter, January 26, 1946

MILITARY SCIENCE

"Snakes" Cleared Trails Of Mines for Allied Tanks

See Front Cover

➤ DETAILS were revealed by the War Department concerning one type of the rumored Army "snakes" that were used in the European theater to cut wires and detonate enemy mines ahead of advancing Allied forces The snake cleared a trail wide enough for a line of tanks to move forward without danger of enemy land-mines A "snake" is shown on the front cover of this SCIENCE NEWS LETTER

This type of mine destroyer is a long metal trough, loaded with two parallel linear explosive charges encased between corrugated aluminum plates, bolted together to form a rigid assembly which can be towed or pushed by a light or medium tank It is 400 feet long, 14 inches wide, five inches high, and weighs about 9,000 pounds, approximately half of which is its load of high explosives

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The snake has a pear-shaped nose that guides it along and assures its passage over rough land The nose is flexible enough to guide the snake over rocks

Special elliptical explosive cartridges, used with the snake, were placed in the trough at intervals of about two and a half feet They were exploded by an impact fuze which was detonated by machine-gun fire from the propelling tank

These snakes were used mostly at night in order that they would not be destroyed by the enemy They were assembled in the field, carefully camouflaged with grass and protected with sandbags, and pushed forward in the hours of darkness when the pushing tanks would be difficult to see The snakes moved forward at a rate of about two miles an hour

Science News Letter, January 26, 1946

AERONAUTICS

Long-Range Research For Aerodynamics

➤ A LONG-RANGE research program has been started by the Army Air Technical Service Command at Wright Field, looking forward to both peacetime flying and air warfare of the future It will be in such fields as the aerodynamics of supersonic speed, means of aiding the human body to stand the forces of such speeds, development of propulsive forces capable of supersonic flight and pilotless aircraft, the push-button warfare forecast for the future

Devices to control robot bombs and other guided missiles from ground installations comprise another project in the present program Still another is research to bring about a change in the "molecular structure of suspended moisture in icing clouds" so that this moisture, gathering on an airplane, can be turned into snow and thus add to safety and speed of flight

Radio and radar equipment for traffic and landing will be included Radio control mechanisms for pilotless planes, rockets and guided missiles, will receive special attention

Science News Letter, January 26, 1946

It is roughly estimated that 10% of American *crops* are destroyed by insects.

The drying and curing of rubber by *electronic heating* is six times faster than conventional processes, and turns out better products because heat is generated uniformly throughout the material.

ENGINEERING

Naval Vessels Preserved

Scientific methods include dehumidification and the use of film preservatives. Will be ready for quick return to duty.

➤ SCIENTIFIC METHODS will preserve naval ships on an inactive list, yet allow them at any time to make a quick return to duty, the American Society of Civil Engineers was told by Rear Admiral John J Manning

Preservation procedure now being followed, he told the engineers, "would insure beyond question that inactive vessels will be susceptible of quick recommissioning when necessary"

The modern techniques for preservation of ships include dehumidification, protection with film preservatives and plastics and other similar measures, he stated The imperative necessity of maintaining inactive vessels in a much higher degree of preservation than was possible heretofore, he declared, was demonstrated by our experience in attempting to recommission hastily the World War I vessels which were loaned to Great Britain

Admiral Manning explained that the Navy now plans to divide its postwar fleet into three basic groups First would be an active fleet, manned about 70% of war complement, a reserve fleet, manned at 30% of war complement and rotated periodically with the active fleet, and, third, an inactive fleet, to be fully decommissioned and placed in a state of preservation such that it can be reactivated when necessary In addition, he said, a considerable number of obsolete combat vessels, surplus auxiliaries and landing craft will be disposed of

Waste Land Reclamation

➤ THE RECLAMATION of millions of waste acres, particularly in 17 arid or semi-arid western states, offers the opportunity to provide much-needed, fertile fields for the production of food required to keep pace with growing world needs, Kenneth W Markwell of the U S Bureau of Reclamation declared at the same meeting.

There is a great need for rebuilding the soil, bringing under cultivation new



BEFORE AND AFTER—At the left the "Snake" is in position for clearing a path through a jungle mine field. Right: results of detonation of the "Snake." Official U. S. Army photographs.

acres that can be farmed economically, harnessing rivers for power, flood control and navigation, and in addition "utilizing to best advantage every drop of water in the West"

In contending that reclamation of the West is essential for a better-fed and healthier America, Mr Markwell asserted that "conservative estimates based upon studies made by the U S Department of Agriculture forecast the necessity for bringing about 40,000,000 new acres of land under cultivation by 1960 to replace marginal and sub-marginal land to meet the needs of a growing population and to supply normal export markets"

He advised civil engineers to "Go West" because of the opportunities in their profession

Science News Letter, January 26, 1946

MEDICINE

Facial Hemiatrophy Cause

Disease in which one side of the face withers is believed due to inborn weakness of the nervous system. No cure is known.

➤ ONE OF THE RAREST diseases of man, a "two-faces" malady in which one side of the face withers until it shows little resemblance to the other, is the subject of a new theory by Dr Robert Wartenberg, neurologist in the University of California Medical School

Disintegration of tissue, partial baldness and sometimes epilepsy are visited on victims of the disease, which is known as progressive facial hemiatrophy Only about 500 cases are known to medical science

The disease, for which no cure is known, is insidious, often progressing for years without the victim realizing its presence. A dimple on the forehead is often the first indication Gradually it may deepen, with wasting of the side of the face, and bald spots may appear at the hairline

Nervous disorders frequently accompany the early facial symptoms, but frequently years pass before the victim realizes he is afflicted with an incurable disease which has altered one side of his face almost beyond recognition

Dr Wartenberg believes that the disease is the result of an inborn weakness of the nervous system Some medical men have expressed the opinion that hemiatrophy is caused by other diseases, such as encephalitis or typhoid, which it often follows

But Dr. Wartenberg says that such diseases and even damage to the brain from serious accident are insufficient explanation for the slow, relentless degeneration found in facial hemiatrophy The very rarity of the disease also rules out explanations which rely on diseases a great number of people have had. The neurologist suggests that contraction of diseases such as encephalitis may provoke facial hemiatrophy in an already weak nervous system or speed up a case which has already been at work

Hemiatrophy appears frequently at adolescence, which, like disease, places greater demands on the nervous system

Dr Wartenberg suggests that the disease is due to a spontaneous degeneration of the higher brain centers, which regulate the growth of and cement the two halves of the body and which provide nourishment to nerve tissue throughout the body

Dr Wartenberg says that the higher centers may be inherently weak, in which case they will usually function satisfactorily if the body is healthy and is not subjected to additional strains of disease or accident

But under the greater demands of such emergencies as disease, or sometimes adolescence, for more nourishment of the tissues, the inherently weak nervous system breaks down and facial hemiatrophy results

While his theory is not provable at the present time, Dr Wartenberg says it seems the most likely from the evidence presently at hand

Science News Letter, January 26, 1946

HORTICULTURE

Water-Lily and Violet Among Plant Patents

➤ OUTSTANDING among recent plant patents is No. 666, a beautiful hybrid pink water-lily originated by Perry D Slocum of Cortland County, N Y Its pointed petals are deep rose pink at the base, passing to almost white at the tips. The flowers remain pink for five days after cutting, whereas previously known pink water-lily varieties fade to a dirty white on the second day

Another beautiful flower, on which plant patent 671 was granted to Frank Rourke of Westfield, Mass, is a hybrid violet, whose long-stemmed blossoms are as big as pansies and of an intense, deep purple The plant produces strong runners which are important in its propagation, and is claimed to be very winter-hardy

Other plants on which patents were issued to breeders included a peach tree, an avocado tree, a hybrid tea rose and a carnation

Science News Letter, January 26, 1946

BIOCHEMISTRY

Stored Cereal Grains Protected from Spoilage

➤ A CHEMICAL treatment of stored cereal grains and cottonseed to eliminate costly spoilage may soon become a common practice, Dr Aaron M Altschul declared at a section meeting of the American Chemical Society at College Station, Texas This advance, he said, is indicated by recent developments in the study of plant hormones

Dr Altschul is a biochemist in the New Orleans southern regional research laboratory of the U S Department of Agriculture, where intensive study is being given to methods of preventing deterioration of seeds during storage It is an important problem because considerable spoilage takes place between harvesting and consumption, particularly in climates of relatively high temperature and humidity

Although many factors influence biochemical activity in seeds, he said, moisture is by far the most important because it affects seed respiration and the resultant production of heat Attempts to define safe moisture limits for seed storage have failed because conditions of growth, maturity and harvest also affect the subsequent behavior of seeds

"The development of our knowledge and use of plant hormones gives us every reason to believe," Dr Altschul declared, "that biologically active agents will be found which will either hasten the completion of maturation even under adverse weather conditions, or will compensate for incomplete maturation by temporarily inhibiting the biological processes in seeds, so that they may be safely stored without loss of viability or of usefulness as a food or for industry"

Science News Letter, January 26, 1946

ELECTRONICS

Locates Survivors at Sea

TNT charge exploding 3,000 feet under water operates hydrophones at shore stations. Can find men within a square mile of sea as far as 2,000 miles from shore.

➤ "SOFAR," an underwater sound system developed by the Navy in cooperation with Woods Hole Oceanographic Institution, makes it possible to locate air and ship survivors far at sea The system utilizes a TNT charge dropped underwater by the survivor and timed to explode at a depth of 3,000 to 4,000 feet, which sets up underwater sound waves that are picked up by hydrophones at shore stations Survivors can be located within a square mile of sea as far as 2,000 miles from shore, it is claimed

To determine the location of the survivor the underwater sound waves must be picked up by three widely separated shore stations, using hydrophones at the same depth By comparing the times when the signal is received and then referring the differences to special charts, station operators are able to plot the position of the explosion within a few minutes after the most distant station receives it

The new system's name, "SOFAR", has no relation to the great distance through which it can be used, but comes from the initial letters of the phrase "Sound Fixing and Ranging" SOFAR depends upon an underwater sound zone, the existence of which was confirmed as a by-product of wartime submarine detection studies carried on for the Navy by Dr Maurice Ewing while director of research in physics for Woods Hole Oceanographic Institution

Dr Ewing's studies, the Navy Department says, demonstrated that, as the result of a "speaking-tube" effect, sound travels amazingly far in the depth zone between 2,000 and 6,000 feet During tests conducted in the Bahamas, sound within the zone was heard with useful intensity a distance of 3,100 miles

No other man-made sound has ever been heard more than a small fraction of this distance, Navy officials declared However, at a depth of 600 feet the TNT bomb explosion could be heard for distances of only 100 to 300 miles

Although the sound lasts less than a second at the point of explosion, it is heard for 24 seconds 2,000 miles away, the Navy states The signal at the receiving hydrophones is likened to a kettledrum building up to a sharp, grand finale The sharp concluding sound makes possible time measurements within one-tenth of a second

Science News Letter, January 26, 1946



SPOTTED SUBS—Equipment for locating the source of high frequency radio transmissions played a major role in defeating the German submarine menace. Direction finders at coastal stations and on board ships proved capable of pinpointing the exact location of any submarine using high frequency transmissions. Official U. S. Navy photograph.

RADIO

German Submarine Menace Was Lessened by HF/DF

➤ THE GERMAN submarine menace in the Atlantic was greatly lessened by the use of a network of high-frequency radio direction finders housed in stations along the coastline on both sides of the ocean and on mid-ocean islands, it has been revealed by the U S Navy Department Cruising warships in the Atlantic were equipped with similar apparatus

German U-boats long followed a practice of coming to the surface at night to report on their high-frequency equipment to their headquarters at Lorient, France When one of these broadcasts was picked up by one of the Allied radio listening posts, the station immediately alerted all other Allied stations, giving them the submarine's radio frequency

All stations immediately tuned to this frequency and each adjusted its direction finder receiver for maximum volume. A device attached to the receiver indicated the direction from which the submarine's broadcast came This direction, or bearing, was immediately sent to a "net control station" which forwarded the information to a plotting center at Washington By plotting the directions on a chart the probable location of the enemy craft was determined In a matter of minutes a "killer" group of escort carriers and destroyers was on the way to attack

This high-frequency radio direction finder system was known technically as HF/DF The Atlantic operations were conducted by a network of American, British and Canadian stations which were grouped into nets for convenience in operation and efficiency in communications. Each net had its own internal communication system with external radio communication from the net control station to the main plotting centers at Washington, London and Ottawa

Science News Letter, January 26, 1946

CHEMISTRY

DDT in Soap Keeps Dogs Free of Fleas for Months

➤ DDT IN DOG SOAPS promises to eliminate the flea problem altogether, if experimental results published in the British scientific journal, *Nature* (Dec 22), are borne out in general practice

Three experimenters connected with commercial firms took a tip from the fact that DDT-treated clothing retains insect-banning powers even after several washings They incorporated DDT in ordinary household soap, and used it in washing 12 dogs, all of long-haired breeds and all infested either with fleas or dog lice Not only did the vermin all die promptly, but the animals did not become re-infested, though all were exposed Only one of the dogs picked up a few fleas nine weeks after treatment

Analysis of samples of hair clipped from the dogs, after washing with DDT soap and rinsing, indicated DDT concentrations of from five to seven hundredths of one per cent. "It is surprising," the experimenters comment, "that these minute amounts of DDT should give such a lasting effect" However, they also call attention to the insecticidal power remaining in clothing that shows only a hundredth of one per cent content of DDT

The experimenters reporting are G A Campbell of the Geigy Company, Ltd., F C Hymas of Spratt's Patent, Ltd., and T F West of Stafford Allen and Sons, Ltd The Geigy Company, Ltd., has applied for a British patent on the use of DDT in dog soap

Science News Letter, January 26 1946

CHEMISTRY

Nylon Has Many Uses In Addition to Hosiery

➤ TO THE USE of nylon for hosiery, many additional uses may be added. It was extensively employed during the war for naval rope, glider lines, paintbrush bristles and many other purposes Now the material will be employed in making unbreakable tableware, drinking cups, combs, and articles too numerous to mention Its strength, toughness and elasticity are responsible

Those who think of nylon primarily as a yarn for hosiery are due for many pleasant surprises, Dr W. W Heckert of the du Pont Company declared at a recent section meeting of the American Chemical Society in Columbus, Ohio He pointed out that nylon had scarcely been introduced into the hosiery field when it was switched entirely to war uses Dr Heckert is a scientist of the company

That nylon was developed in the first place, he said, is a tribute to the persistence of scientific workers who conducted the long-range fundamental research program responsible for the product The program was begun in 1928, he explained, and was designed primarily to obtain basic knowledge about chemical materials and processes, with no thought that the information so developed would be of immediate practical value

In 1938, the company announced the development of new synthetic materials from which textile fibers stronger and more elastic than any previously known could be spun. There still remained the tasks of producing yarn and the necessary machinery, and to put the yarn to practical application

Science News Letter, January 26, 1946

ENGINEERING

New High-Efficiency Fluorescent Lamp

➤ THE WESTINGHOUSE Electric Corporation is assignee of two new patents on lamps, Nos 2,392,305 and 2,392,333 respectively The first is on a high-efficiency fluorescent lamp, developed by Dr N C. Beese of Verona, N J It is shaped like the ordinary incandescent bulb and utilizes arsenic instead of mercury to produce the ultraviolet radiations that produce visible light when they strike the phosphor minerals distributed on the inside of the outer glass envelope. With the use of zinc cadmium sulfide as phospor, a continuous spectrum, closely approximating daylight, is obtained. Another advantage is efficient operation over a wider temperature range than is possible with the familiar mercury lamps

The second lamp, devised by Chalmers Morehead of East Orange, N J, made its bow to the public only a short time ago, as the fluorescent bulb for Christmas-tree illumination This little lamp is cooler in operation, and hence consumes less current; it gives more pleasing color effects than are obtainable with colored glass or filters; finally, if one unit burns out it does not extinguish the whole series, as is the case with the older incandescent Christmas-tree lamps

Science News Letter January 26, 1946

IN SCIEN

ENTOMOLOGY

Carbon Dioxide Is Best Anesthetic for Insects

➤ CARBON DIOXIDE, the gas that puts the fizz in soda-fountain drinks, as well as the bead in beer, has been found better than ether as an anesthetic for use on insects being subjected to delicate surgical procedures needed in certain types of research, reports Dr. Carroll M Williams, Harvard University research fellow (*Science,* Jan 11)

Dr Williams describes a very simple operating stage which he uses in his work It consists merely of a porcelain funnel with a perforated plate across its bottom The spout of the funnel is attached to the outlet of a carbon dioxide cylinder, and the funnel itself is set into an opening in the laboratory table so that the operator can observe his work through a dissecting microscope

Since carbon dioxide is heavier than air, it tends to stay within the funnel, and is not too rapidly carried off by stray air currents Unlike ether, it has no odor, and in low concentrations does not affect the experimenter Insects recover rapidly when it is turned off, and seem none the worse after even prolonged anesthesia

Science News Letter, January 26, 1946

CHEMISTRY

Featherweight Material Has Enormous Strength

➤ A NEW featherweight construction material of enormous strength is announced by the Glenn L Martin Company and also by the U S Plywood Corporation It is predicted by these two companies that the new material will revolutionize construction techniques in the whole field of transportation

It is made of a newly-developed "honeycomb" of cloth or paper sandwiched between and firmly bonded to thin sheets of aluminum, stainless steel, wood veneer or plastic It is claimed that the new sheets are far stronger than anything at the same weight now being manufactured A practical method of bonding the metal or veneer sheets to the honeycomb makes the new product possible

Science News Letter, January 26, 1946

E FIELDS

PALEONTOLOGY

Bulldozer Makes Possible Quick Rescue of Fossils

➤ A BULLDOZER, husky wartime pet of Army Engineers and Navy Seabees, demonstrated its value to peacetime science when a new flood control dam on the Licking river threatened to wipe out a valuable fossil bed at Lower Blue Licks Spring, Dr Willard R Jillson, consulting geologist of Frankfort, Ky, reports (*Science*, Jan 11)

To demonstrate that great quantities of scientifically valuable fossils are still embedded in the Ice Age deposits at the site, Maj Victor K. Dodge of Lexington, a well-known amateur naturalist, personally sponsored a "quickie" exploration A bulldozer rapidly stripped off the non-fossil-bearing three feet of recent top soil, gravel and loose limestone Then the diggers went to work with hand tools

They found bones and tusks of a mastodon, skulls and other bones of extinct giant bison, and what appears to be part of the jawbone of a giant Ice-Age beaver, first to be recognized at this locality The fossils were removed to the museum of the University of Kentucky, where they have been cleaned and placed on exhibition

After the fossils had been dug up, the bulldozer went to work again, refilling the excavation All the work was accomplished during one day

Science News Letter, January 26, 1946

PHYSIOLOGY

Thoroughbred Horses Have More Hemoglobin

➤ THOROUGHBREDS really do have blood that is different from that of other horses, investigations by Dr John Macleod of Cornell University Medical College and Dr Eric Ponder of the Nassau Hospital at Mineola, N Y, have shown (*Science*, Jan 18).

The two scientists counted red corpuscles and measured the oxygen-carrying hemoglobin in blood samples from thoroughbred and draft-type, or "cold-blooded," horses They found that the thoroughbreds have smaller red cells than the cold-blooded horses, and that the hemoglobin concentration in their cells is lower However, the thoroughbreds have so many more red cells per cubic millimeter of blood that the actual quantity of hemoglobin per unit volume is larger in the race horses than in their heavier, slower brethren

Drs. Macleod and Ponder are inclined to believe that the difference is hereditary, rather than the results of training or conditioning processes which prepare thoroughbreds for racing. This supposition is supported by the fact that the blood differences noted hold good for thoroughbreds at all ages, even for newly foaled colts

"It may very well be," they state in conclusion, "that the increased hemoglobin content and slightly smaller cell size confer an advantage on the thoroughbred when running at high speeds, and so these may be characteristics which have become accentuated in the process of the 'improvement of the breed'"

Science News Letter, January 26, 1946

PHYSIOLOGY

Electric Eel Has Used Radar Principle for Years

➤ THE ELECTRIC EEL has used principles somewhat similar to radar for millions of years to locate living food, Dr C W Coates of the New York Zoological Society demonstrated at a recent meeting of the organization The eel has two kinds of discharges, he showed, one to determine the presence of fish, frogs or other animals, the other to stun or kill the prey.

In the muddy South American streams where they live, electric eels send out frequent electric impulses which, striking such food possibilities as other fish or frogs, bounce back and affect the senders' sensory apparatus Having detected food or sensed an enemy, the eel discharges a shock of several hundred volts, sufficient to stun or kill almost any animal in the vicinity

The demonstration given by Dr Coates was an enlargement of previous shows, made possible by the use of war-developed equipment He used an oscillograph and a special projection lens With these the exploratory impulses and the lethal shocks were shown on a large screen in impressive wave forms.

In the demonstration two electric eels were used They were in a water-filled tank about six feet long, with conducting screens of electrodes at both ends. The eels were about four feet in length He showed the intensity of their discharges by lighting 33 two-watt neon lamps

Science News Letter, January 26, 1946

GENERAL SCIENCE

$1,000 Award for Best Science News Writing

➤ SCIENCE NEWS writing, the bridge between highly specialized research and general public understanding, is to be the subject of formal and substantial recognition by the American Association for the Advancement of Science

A fund, known as the George Westinghouse Science Writing Award Fund, has been established by the Westinghouse Educational Foundation, which will provide an annual prize of $1,000 to be given to a newspaper writer for outstanding science reporting There will also be an annual citation to the newspaper whose science news coverage in the preceding year is adjudged most complete and authoritative and most interestingly presented

The first annual awards, covering the present year, will be made at the midwinter meeting of the Association, to be held in December, 1946 Details of judging and presentation will be announced at the spring meeting of the Association in St Louis, March 27 to 31

Science News Letter, January 26 1946

PHARMACY

Worked 24 Hours a Day On Antimalarial Drug

➤ FOR A THREE-WEEK period, chemists at the University of Illinois worked 24 hours a day, in three shifts, to speed production of a chemical needed for making the new antimalarial drug, SN 7618

The chemical is 4 7-dichloroquinoline An original and simple method of synthesizing it was worked out by two of the university's scientists, Prof. Charles C. Price and Royston M Roberts, in August, 1944

Development of this simple method of synthesis made possible large-scale commercial production of SN 7618 Lack of such a method caused German scientists, who had also developed SN 7618, to discard it as an antimalarial

The existence of SN 7618 was kept secret until the first of this year (Jan 4), when the Board for the Coordination of Malarial Studies announced that it had been developed and found much superior to atabrine for suppressing malaria Its chief advantages are that it need only be taken once a week, instead of daily, to suppress malaria attacks and that it does not turn the skin yellow

Science News Letter, January 26, 1946

ASTRONOMY

Quadruplets in the Sky

Mars and Saturn join Castor and Pollux on February evenings. Jupiter is visible late at night on the first, and earlier at the end of the month.

By JAMES STOKLEY

➤ THOUGH ONLY MARS and Saturn, the same two planets that have been decorating the evening skies all winter, are now visible at a respectable hour, a third planet which is brighter than either comes up a little later in the night This is Jupiter, and about Feb 1 it appears a little to the south of the east point around midnight It is in the constellation of Virgo, the virgin, and is close to Spica, brightest star in the figure At the end of February it will rise about 10 00 p m

Mars and Saturn are close together in the constellation of Gemini, the twins, and with Castor and Pollux, the brightest stars, make it temporarily quadruplets For recent months both of these planets have been moving in a "retrograde" or backward direction That is, their path through the sky among the stars has been toward the west, because the earth has overtaken them, producing the same effect observed when an automobile overtakes a horse and carriage to people in the auto, the other vehicle seems to be going in the opposite direction On Feb 21, however, Mars is stationary in the sky, and after that it will move toward the east once more, on the 19th of March passing Saturn, which will itself stand still and start to move eastwards a day later.

Sirius Is Brightest

The positions of the February evening stars and planets are shown on the accompanying maps, which are drawn for about 10·00 p. m, your local time, at the beginning of the month, and an hour earlier on the 15th Most brilliant object shown is the Star Sirius, in Canis Major, the great dog This star is brighter even than Mars or Saturn. It is not quite as bright as Jupiter, though when that planet appears it will look fainter because it is so low in the sky and its brilliance is dimmed by the passage of its light through a great thickness of the earth's atmosphere

Sirius is directly south, and above it are a number of other prominent constellations To the right is Orion, the warrior Three stars in a row mark Orion's belt Above the belt is Betelgeuse and below is Rigel Also above the belt, though not classed as first magnitude, is Bellatrix, a star, which, like Betelguese, is supposed to be one of the giant's shoulders On the old star maps where these fanciful figures were depicted around the stars was also an uplifted club, to the right of Bellatrix, which Orion is using to protect himself from the charging bull, Taurus, the constellation next above and to the right

Aldebaran, red in color, forms the bull's eye, and the V-shaped group of stars, of which it is part (called the Hyades), his head The two stars above Orion, towards Auriga, the charioteer, are the tips of the horns. In Auriga itself, almost overhead, is first-magnitude Capella Gemini, the twins, are above and to the left of Orion, and this group can now easily be found because of the bright planets that it contains

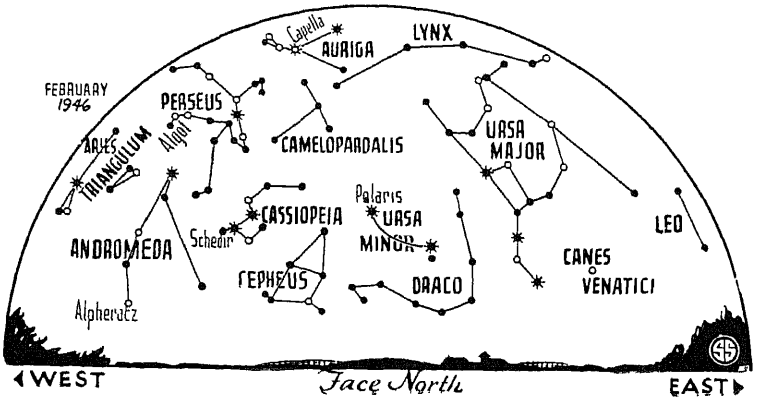
Below Gemini is Canis Minor, the lesser dog, with the star Procyon About as high as Canis Minor, toward the east, is Leo, the lion, containing another star of the first magnitude, called Regulus

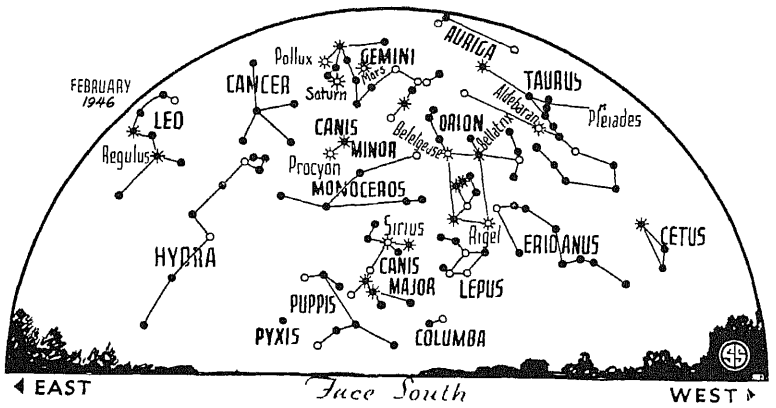
During the earlier part of February, the moon will pass through the part of the sky we have been describing New on Feb 1, it will appear a couple of days later in the west as a narrow crescent seen just after sunset On Feb 8 it reaches first quarter and a few days later, during the night of Feb 12, passes Mars and then Saturn Feb 15 brings full moon, and on the 20th, during daylight hours for the United States, it passes Jupiter The other naked eye planets, Mercury and Venus, are not visible in February In fact, on Feb 1, Venus is in line with the sun and beyond it, and on Feb 10 Mercury is in a similar position

The apparent movement of the sun around the sky during the year is an effect of the earth's motion around the sun, so that at different times it stands against a different background of stars This also causes the general easterly movement of the planets, though they are moving themselves, and the combination of their motions with that of the earth produces the complicated paths, sometimes westerly but mostly easterly, that they pursue

Apparent Motion

Even more familiar is the daily motion of the whole sky from east to west, which makes the sun, and most of the other heavenly bodies, seem to rise and set as well as to travel across the sky This again is merely an apparent motion, for it is the earth turning on its axis from west to east that causes it Consequently, the stars seem to turn around a center in the north, which is the north celestial pole, the place where the earth's axis, if extended, would touch the sky Polaris, the pole star, is very close to this center and so it turns in a small circle each day Other stars, farther from it, turn in larger circles, an effect that can easily be shown by taking





a photograph at night, with the camera pointed to the northern sky, and giving an exposure of several hours

If a person were to stand at the north pole of the earth, the north celestial pole, of course, would be directly overhead Traveling southward (which is the only way one can travel from the north pole!) the celestial pole descends, until at the equator it stands on the horizon Thus, the height of the north celestial pole depends on the latitude of the observer At the equator its altitude is zero degrees, and this is the latitude of the equator In the United States, approximately 40 degrees latitude, the celestial pole is 40 degrees above the northern horizon

Since the stars turn in circles about the celestial pole this means that for us any star or other object, such as a comet, that is within 40 degrees of the pole will never get below the horizon In other words, for any place on the earth, in the northern hemisphere, there is a circular area in the northern sky, of radius equal to the latitude, in which the stars never set At the north pole of the earth, where the latitude is 90 degrees, this includes the entire sky There no star ever rises or sets At the equator, on the other hand, every star rises and sets

For us, the pole star and the constellation of Ursa Minor, of which it is part, Ursa Major, the great bear, which contains the Great Dipper, Cassiopeia, the queen, Cepheus, the king and Draco, the dragon, are all circumpolar constellations—ones which never descend from the sky Stars farther south do rise and set, and the farther south they are the shorter is the time in which they are above the southern horizon And finally, around the south pole of the sky, which is as far below the southern horizon as the north celestial pole is above it, there is another circle of stars which never rise Among these are the constellations of Crux, the southern cross, Centaurus, the centaur, containing the nearest star, alpha Centauri, and much of Argo, the ship, which is the largest constellation in the sky

Argo is so big, in fact, that it is subdivided into four parts These are Puppis, the stern, Vela, the sails, Carina, the keel, and Pyxis, the compass The brightest star in the whole group of figures is Canopus, part of Carina, which is far south and never rises for most of the United States All of Pyxis comes above the horizon for latitude 40 degrees north, but only one star is bright enough to be indicated on these maps This is alpha Pyxidis, of the fourth magnitude Next to it is Puppis, of which a number of stars are shown, and which extends up alongside of Canis Major This time of year is the best chance to see this group, for now it is in the evening sky Part of Vela, just below Pyxis, gets above our horizon, but not far enough to be seen easily

Celestial Time Table for February

Feb	EST	
1	9 00 a m	Venus in line with sun on farther side
	9 56 a. m	Moon passes Mercury
	10 38 p m	Moon passes Venus
	11 43 p m	New moon
8	11 28 p m	Moon in first quarter
9	5 00 a m	Moon nearest—distance 230,080 miles
10	9 00 p m	Mercury in line with sun on far side
11	8 00 p m	Jupiter starts westerly motion
12	9 24 p m	Moon passes Mars
13	4 20 a m	Moon passes Saturn
15	11 28 p m	Full moon
20	3 16 p m	Moon passes Jupiter
21	10 00 p m	Mars starts easterly motion
22	11 00 p m	Moon farthest—distance 251,214 miles
23	9 36 p m	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three for PST.

CHEMISTRY

New Glasses Contain Little or No Silica

➤ NEW KINDS of glass made without the use of the ordinary glass sands employed for centuries, may become increasingly important as further developed particularly for service in optics, photography, enamels, glasses transparent to ultraviolet rays, and in special colored glasses

These new glasses contain little or no silica, the substance long regarded as essential in glass-making, but are made with the use of phosphates, borates or fluorides, according to Dr Frank L Jones of Bausch and Lomb Optical Company, who discussed non-silica glasses at a section meeting of the American Chemical Society in Terre Haute, Ind

Phosphate, borate and fluoride glasses, he says, resemble silicate glasses in general principles of chemical constitution, but differ from them and from one another in important chemical and physical properties The non-silica glasses have already proven their value in the photographic field For general use in the field of optical instruments, he states, it is likely that the glasses intermediate between the older silica glasses and the new non-silica glasses will be especially valuable

Science News Letter, January 26, 1946

HOME ECONOMICS

Nuts Easily Cracked When Soaked in Salt Water

➤ NUT shells, particularly those of pecans, become soft and easy to crack when soaked in salt water for a few hours The nut meats can then be easily removed whole, agriculture extension agents in Mississippi have found

Science News Letter, January 26, 1946

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Do You Know?

Sharkskin was used as an abrasive before sandpaper was invented

Arsenic compounds have been used to supplement quinine in treating malaria.

Tetanus antitoxin, produced by a new method, will not cause the chills often accompanying use of this antitoxin

Petroleum was used in Biblical days, it is said, for medical purposes, chiefly for wounds and skin infections, and was poured over camels afflicted with mange

Abaca, from which Manila hemp is obtained, was never grown in the Western Hemisphere until the war cut off the Philippine product, now there are some 27,500 acres of abaca in Central America

Fog-making machines, developed to hide military operations from enemy eyes, are being tested as a possible means for distributing insecticides over crop areas.

Soybean is now America's glamour crop, furnishing 13% of the total production of edible fats and oils, and being the largest single protein concentrate for feeding farm animals

Coal, once regarded only as a source of heat and energy, is now a vital source of raw materials for nylon, synthetic rubber, chemicals and other products, and may, in the future, be the principal source of automobile fuel.

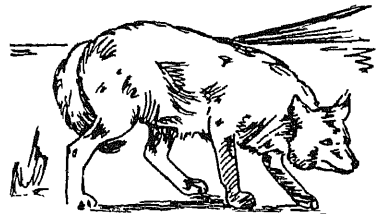
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By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

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ECOLOGY

NATURE RAMBLINGS by Frank Thone



Poor Relation

➤ WOLVES were very common throughout this country when white settlers first came; coyotes were confined largely to the untimbered regions west of the Mississippi Now the wolves are practically all gone from the East and are scarce even in the West, whereas coyotes are still to be found (even if in diminished numbers) throughout their original range, and are even reported to be spreading eastward

This vanishing of the strong and survival of the weak becomes a little less puzzling when one looks a little more closely at the habits of the two groups of animals, and especially when one takes into consideration the reaction of the dominant killer-species, man, to the twain

Wolves were predominantly woodland animals· "timber wolf" was not an idly given name. Even the big lobo of the West, the so-called plains wolf, liked to lurk in the timber strips along the streams That meant that as the East was stripped of its original mantle of forests there came to be fewer and fewer places where a wolf could live as a wolf likes to live.

The coyote, on the other hand, was less disturbed by settlement He had always been used to more open country, so that the felling of the timber meant less hardship to him Moreover, his original home was settled much later than the East, and still is more sparsely populated, so that he still has room to get around His reported eastward rovings are understandable on this basis, too the country has become much more open, so an open-country species can thrive in it.

Farmers and ranchers have always been more hostile to wolves than to coyotes. Wolves were really dangerous to livestock, while coyotes lacked the strength and courage to tackle anything but stray young animals, and old ones about ready to die anyway So wolves were harried by skilled professional hunters, while nobody bothered much about coyotes except to take offhand shots at them if they prowled too close to a ranch-house If they did become too numerous, they were given the uncomplimentary treatment of traps and poison, rather than the honor of individual attention and persistent pursuit

In general, wolves got the attention that proud aristocrats usually get from invaders for the comfort and convenience of the newcomers they had to be eliminated Coyotes, like inconsequential poor relations, could be tolerated, so they are still with us

Science News Letter, January 26, 1946

AERONAUTICS

Lawrence Sperry Award Goes to Richard Hutton

➤ THE LAWRENCE Sperry award for 1945 will be given to Richard Hutton of the Grumman Aircraft Engineering Corporation for his notable contributions in the aviation development field This award is made annually by the Institute of the Aeronautical Sciences for an outstanding contribution made by a young man to the advancement of aeronautics

The award is an honorarium of $250, in memory of the late Lawrence Sperry who lost his life in a forced landing in 1923 in the English Channel Presentation will be made on Jan 28 in New York

Science News Letter, January 26, 1946

METEOROLOGY-AERONAUTICS

Meteorology Contribution Recognized by Award

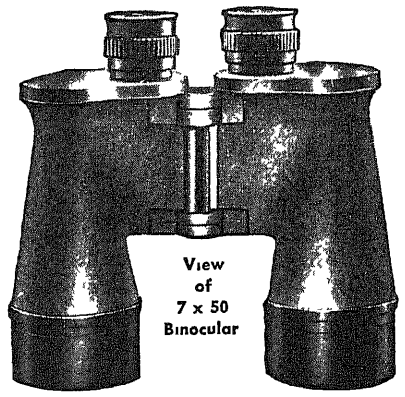
➤ THE ROBERT M LOSEY Award for 1945 of the Institute of the Aeronautical Sciences will be presented to Harry Wexler of the U S Weather Bureau, it is announced, for his outstanding contributions to the science of meteorology as applied to aeronautics

This annual award was founded in honor of Capt Robert Moffat Losey, a meteorological officer of the U S Army, killed in Norway on April 21, 1940, and who perhaps can be called the first American officer killed in World War II

Science News Letter, January 26, 1946

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New Tomato Variety

Specially bred for growing in lowland tropics, hybrid is now being supplied to Americans at tropical bases. Has been named "Turrialba."

➤ A NEW TOMATO variety, specially bred at the Inter-American Institute of Agricultural Sciences in Costa Rica, to produce well in the warm lowlands of the tropic zone, is now being used to supply American armed forces still on duty at overseas bases to the south, Joseph L Fennell, chief of the division of food crops at the Institute, reports (*Agriculture in the Americas*, Dec) The new variety has been named "Turrialba", for the majestic volcano that dominates the terrain where the Institute is situated

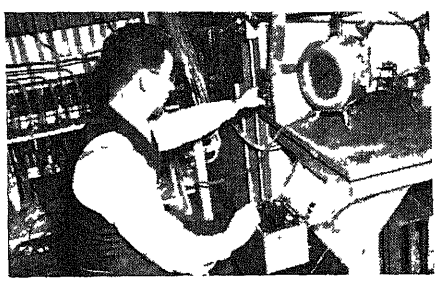
Breeding tomatoes for use in the tropics might seem a bit like carrying coals to Newcastle, for the tomato species is native to the warmer parts of the Americas. However, in its native form the fruit is a miniature, cherry-sized affair—being commonly known, indeed, as the cherry tomato All the big, firm-fleshed varieties have been bred for temperate-zone conditions, and extensive tests showed that none of these would do well in tropical climates

A hybrid between one of the most southerly of temperate-zone tomatoes, known as Cuban Marglobe, with one of the larger-fruited strains of cherry tomato was therefore undertaken The third generation of offspring, only 16 months from the original cross, proved good enough to be used for large-scale growing Even of the first-generation cross, about 400 crates of the fruit have been purchased and distributed to American bases in the tropics

The Turrialba tomato looks rather like its Marglobe parent, although it is a little flatter in shape It produces large, firm-fleshed, smooth-skinned fruit, bright red throughout Both plants and fruits are reported to have satisfactory resistance to plant diseases

The plant breeders who produced the new variety are not yet well enough satisfied with it to offer seed for general planting It is still so close to the original cross that undesirable traits of various kinds keep cropping up, which must be eliminated before it can be counted a full commercial success Satisfactory stabilization of the variety's genetic characters should be accomplished within a relatively few plant generations

Science News Letter, January 26, 1946



HANDY EQUIPMENT FOR TEMPERATURE CHECKS

Measuring the temperature of a leaf surface, to determine the effect of insect feeding and of spray materials, is typical of hundreds of measuring and checking studies made at Ohio State University, for which equipment like that shown above is being used This type of equipment is preferred where the temperature to be measured is that of a point or spot accessible to the tip of a fine-wire thermocouple

Instrument shown measuring the emf of such a couple is a Portable Millivolt Indicator No 8657 C, which has ranges 0-16 and 16-64 mv, and thus accommodates any couple across its entire range with good sensitivity and accuracy. Its price is $145 00, complete with galvanometer, standard cell and battery.

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SEISMOLOGY

Earthquake Forecasting Lacks Scientific Basis

➤ EARTHQUAKE forecasts, though often made and as often accepted by the unwary, still have no scientific basis, declared Dr James B. Macelwane, dean of the Institute of Geophysical Technology at St Louis University

"From time to time articles have appeared in the newspapers about men who claimed to have arrived at a complete solution of the problem of earthquake forecasting They give you long lists of supposed verifications to prove the success of their predictions.

"Some forecasters base their predictions on the influence of the moon, others on the relative position of certain planets, others on sunspot activity, and no doubt there are persons entirely sincere who are allured and deceived by a specious theory and by a series of apparent verifications, but who lack sufficient scientific background to make a critical appraisal of the factors involved"

Highly generalized predictions for general regions where earthquakes are frequent cannot be considered real predictions, Dr Macelwane pointed out For example, to say that an earthquake will occur in Japan next week is a perfectly safe guess to make, for Japan averages about two dozen quakes every week, but such a statement has no value as a forecast

To be really useful, the speaker insisted, an earthquake forecast must be specific, giving time, place and intensity, it must also be reliable enough to justify public authorities in preparing for the predicted disaster

Seismologists have hopefully followed such leads as the claimed "bunching" of earthquakes in cycles, and their supposed association with earth creep and earth tilt, but none of these efforts has paid out with really reliable results

Dr Macelwane's talk was delivered during the intermission period in a concert of the New York Philharmonic-Symphony Orchestra It was broadcast over the network of the Columbia Broadcasting System, under the auspices of the United States Rubber Company

Science News Letter, January 26, 1946

CHEMISTRY

Seaweed Product Used In Waterproofing

➤ NEGLECTED and largely wasted resource, the giant seaweeds of the Pacific coast, supplies material for an improved bitumen waterproofing material, in the formula on which patent 2,393,022 was issued to three San Diego inventors, D E Clark, A B Steiner and K F Gibsen, assignors to the Kelco Company In it, a salt of alginic acid (the seaweed product) is combined with asphalt, water and a copper-ammonium complex to form a solid, tough, nontacky compound that is stable over a wide range of temperatures

Science News Letter, January 26, 1946

The *typhus epidemic* of Naples in 1943 was the first to be stopped in winter, this was due to the use of DDT.

• Books of the Week •

THE ADVANCEMENT OF SCIENCE—Vol 3, No 11, *British Assn for the Advancement of Science,* 66 p, 5s Contains Science in Education by A E McKenzie, Producing Oils by Dr G D Hobson, Plant Breeding and Genetics Today by Dr P S Hudson, Science in Building by J L Martin

AMERICAN AVIATION DIRECTORY—Wayne W Parrish—*American Aviation Associates,* 649 p, $7 50 Fall-Winter, 1945-46 Aviation officials and companies of U S, Canada, Latin America, Africa, Europe and Australasia

BIOLOGICAL FIELD STATIONS OF THE WORLD—Homer A Jack—*Chronica Botanica Co,* 73 p, diagr, $2 50 Presents heretofore scattered and unpublished material, will aid in the selection of a station for study or research and will show directors of biological stations how their fellow-administrators are solving problems attendant upon the administration of these institutions

CHECK-LIST OF BIRDS OF THE WORLD—vol 5—James Lee Peters—*Harvard Univ Press,* 306 p, $5 Treats the following families Trochilidae, Coliidae, Trogonidae, Alcedinidae, Todidae, Momotidae, Meropidae, Coraciidae, Leptosomatidae, Upupidae, Phoeniculidae and Bucerotidae Gives description of the geographical range of each form and lists the more recent literature on each form

ELECTRON OPTICS AND THE ELECTRON MICROSCOPE—V K Zworykin, G A Morton, E C Ramberg, J Hillier, A W. Vance—*John Wiley,* 766 p, diagr and illus, $10 Will aid the electron microscopist in understanding and utilizing his instrument to the fullest advantage and will assist the electron optical designer with practical and theoretical knowledge

FOREST PRODUCTS RESEARCH GUIDE IN FUNDAMENTAL AND APPLIED RESEARCH—*American Forest Products Industries,* 142 p, $2 Summarizes the sources of reliable scientific and technical information resulting from research in forest products and the further research needed to round out the knowledge of wood necessary for maximum wood products development

JOBS AND THE MAN—Luther E Woodward and Thomas A C Rennie—*Charles C Thomas,* 132 p, charts, $2 Expert advice for employers and supervisors, especially those hiring veterans coming back nervous, written by men who have dealt directly with these problems

MAKING HEALTH VISIBLE—*Board of Trustees of Cleveland Health Museum* 32 p, illus, 25 cents A summary of original objectives, early and current organization, present status, description of exhibits, future aims of the Cleveland Health Museum

SURGICAL TREATMENT OF THE MOTOR-SKELETAL SYSTEM—Frederic W Bancroft and Clay Ray Murray, Editors—*Lippincott,* 1283 p, diagr and illus, $20 (two volumes) Designed for the use of the average general surgeon and orthopedic surgeon who has to deal with lesions involving the motor-skeletal system Indicates what to do, how to do it, and what not to do for the various conditions affecting this system

TWENTIETH CENTURY SOCIOLOGY—Georges Gurvitch and Wilbert E Moore, Editors—*Philosophical Library,* 754 p, $6 Emphasizing the major developments in sociological science in the present century A collection of essays by Huntington Cairns, Pitirim A Sorokin, Claude Lévi-Strauss, Robert E L Faris and many others

WE CAN HAVE BETTER SCHOOLS—Maxwell S Stewart—*Public Affairs Committee,* 31 p, illus, 10 cents Important issues in postwar education Public Affairs Pamphlet No 112

THE WILDCATTERS an informal history of oil hunting in America—Samuel W Tait, Jr, *Princeton Univ Press,* 218 p, illus, $3 The saga of pioneers of the oil industry, based on the author's years of work in the oil regions and on interviews with men who participated in discoveries which made oil history

Science News Letter, January 26, 1946

ENGINEERING

Crosley Car Runs 50 Miles On One Gallon of Gas

➤ HIGH POWER, light weight, low cost and economy in operation are features claimed for the new streamlined Crosley automobile by its maker, Crosley Motors, Inc Although 28 inches longer, complete with an aluminum turret top, and having an engine twice as powerful as the prewar model, it will weigh no more than the old canvas-top car

The new Crosley is capable of a top speed of 60 miles an hour, and it can run 50 miles on a single gallon of ordinary gasoline at 35 miles an hour, it is claimed The use of aluminum in place of steel saves 200 pounds in weight Its water-cooled engine is a 26-horsepower plant with four cylinders The car is approximately 12 feet in length from bumper to bumper, has an 80-inch wheel base and a 40-inch tread Its overall height is 57 inches It seats four persons

Science News Letter, January 26, 1946

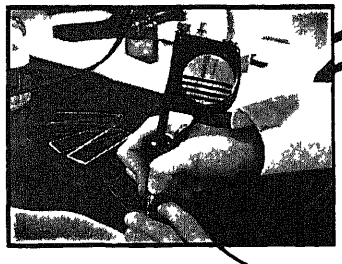
AERONAUTICS

Capt. Tribus Awarded Thurman H. Bane Prize

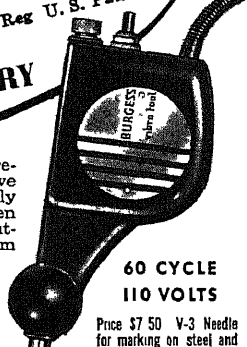
➤ THE THURMAN H BANE award for 1945 will go to Capt Myron Tribus of the Army Air Technical Service Command, it is announced by the Institute of the Aeronautical Sciences The award is made "for reducing the icing hazards of high-speed flying through research and flight testing"

The Bane award, established in 1942, is given to an officer or civilian of the Army Air Forces Materiel Command for an outstanding achievement in aeronautical development during the year

Science News Letter, January 26, 1946



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New Machines and Gadgets

⚙ *STEPLADDER usable on uneven surfaces has an adjustable supporting rear frame The two rear legs are connected by cross arms pivoted at the corners, which in turn are pivoted to a fixed downward-projecting center piece hinged to the top of the ladder A thumbscrew holds the frame in position*

Science News Letter, January 26, 1946

⚙ *SOAP SHEETS are single layers of soap between two porous sheets of paper, and are for individual use to prevent the danger of transmitting skin diseases by the common use of a cake of soap The paper, when wet, disintegrates and is carried down the drain pipe*

Science News Letter, January 26, 1946

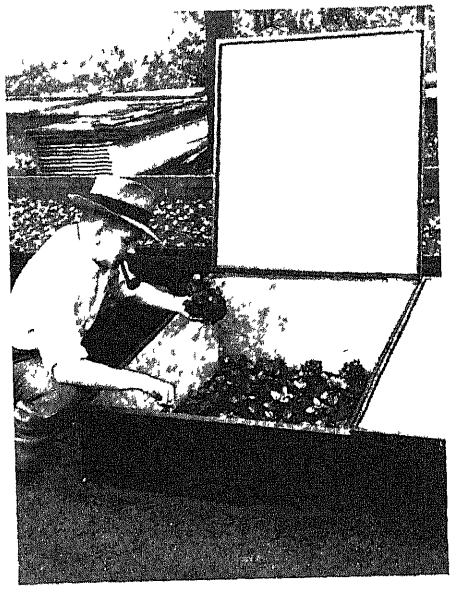
⚙ *MECHANICAL SHAKER, called a test table, pitches and tosses packaged articles, giving them bumps and shocks similar to those they would get on a long railroad trip in a freight car The device is used to determine proper packaging*

Science News Letter, January 26, 1946

⚙ *LEVERAGE screwdriver looks like the ordinary tool when its power arm is closed because the arm is shaped to fit over half the handle The arm is pivoted at the shank of the blade and can be turned at a right angle and used as a lever to help turn a sticking screw*

Science News Letter, January 26, 1946

⚙ *COLD FRAMES for starting early vegetables are available in complete units that can be assembled with pliers and a screwdriver A section is shown in the picture The frame is treated, painted steel, lined with Fiberglas for insulation The cover is a wire-reinforced transparent plastic*



Science News Letter, January 26, 1946

⚙ *PROJECTOR-VIEWER has a tilting section that permits pictures to be projected on a built-in ground glass screen or on a conventional home movie screen. It is housed in a three-piece molded plastic case, and is designed to handle two-by-two inch kodachromes, black and white slides, and dental X-ray mounts*

Science News Letter, January 26, 1946

⚙ *NYLON drinking cups, available soon, can be dropped on the bathroom floor without damage and can be sterilized in boiling water or steam The first-comers will be only in the natural color of the nylon, a translucent ivory*

Science News Letter, January 26, 1946

⚙ *ELECTRONIC INSTRUMENT determines the interior condition of nonmagnetic metal tubes in heat exchange units Its long, flexible probe cable is inserted within the tube The instrument detects and records all types of irregularities in the tubes*

Science News Letter, January 26, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 295

Question Box

AGRICULTURE

What new tomato variety has been developed? p. 62

BIOCHEMISTRY

How may stored cereal grains be protected against spoilage? p 54

CHEMISTRY

What substance is used in place of silica in the new glasses? p 59

ELECTRONICS

What is "SOFAR"? p. 55

What is the throat microphone? p 52.

EMBRYOLOGY-GENETICS

How is it possible for unborn female mice to bear young? p. 51

ENGINEERING

What is the best way to keep our ships ready for action? p 53

ENTOMOLOGY

What anesthetic has been found best for insects? p 56

MEDICINE

What is now believed to be the cause of facial hemiatrophy? p 54

MEDICINE-CHEMISTRY

What chemical helps penicillin do a better job? p 51

MILITARY SCIENCE

What is the "snake"? p 52

PALEONTOLOGY

How did a bulldozer save time in recovering fossils? p 57

PHYSIOLOGY

How has it been proven that thoroughbreds do have different blood? p 57

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BOOKS

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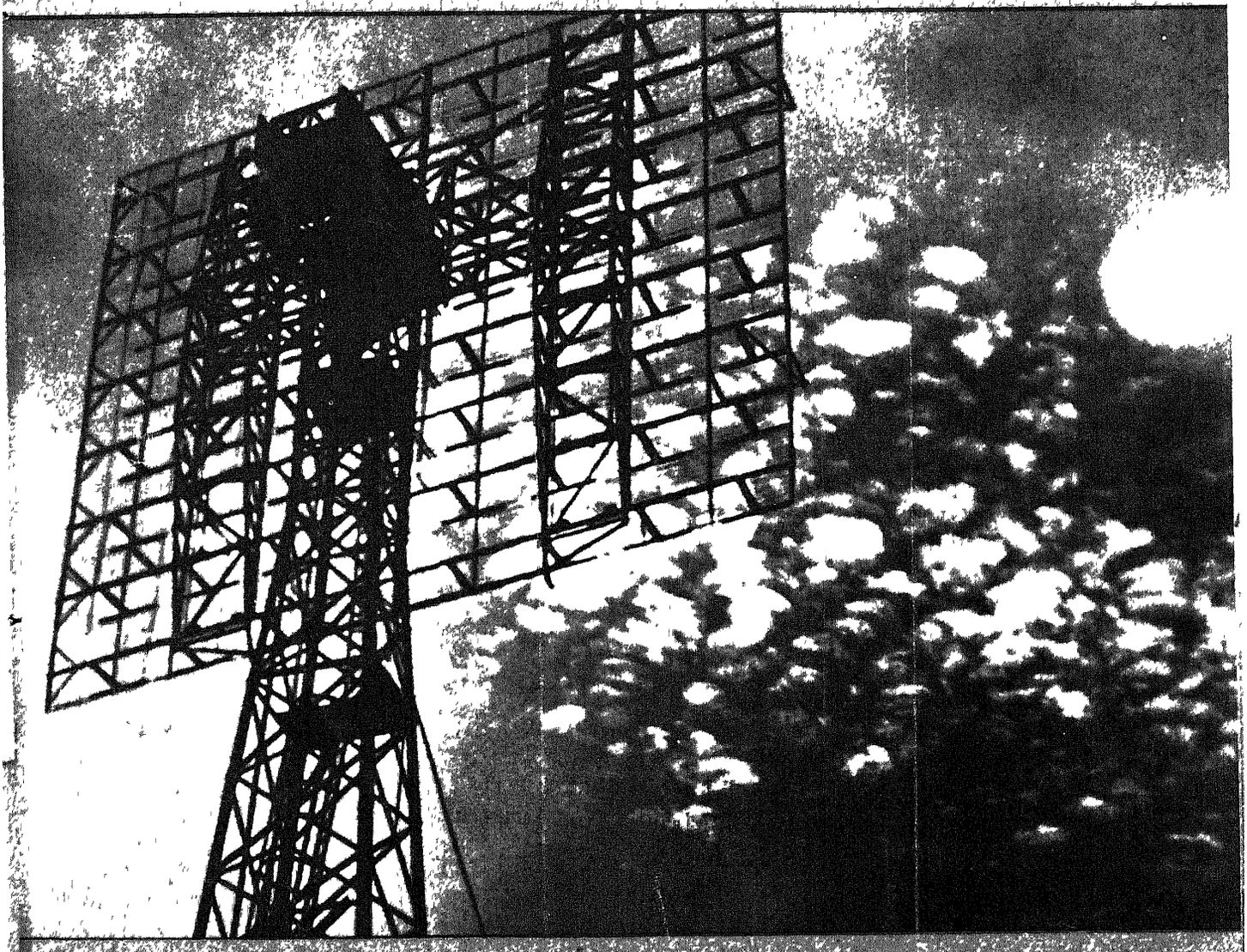
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 2, 1946



Contact with the Moon

See Page 67

A SCIENCE SERVICE PUBLICATION

ELECTRONICS

Escaped Radio Waves

They are constantly being sent beyond the atmosphere that surrounds our earth, but have only recently been reflected back to us.

➤ RADIO WAVES are constantly being sent beyond the atmosphere that surrounds our earth, but only recently have any of these "escaped" impulses been reflected back to us

The SOS of a ship in peril on the sea, the messages with which far-away adventurers at the ends of the world keep in reassuring touch with those at home, and the globe-encircling signals of radio amateurs and professionals are all made possible by reflection from ionized layers, consisting of electrified particles, many, many miles above the tallest transmitting tower

When a transmitting station sends out a series of radio signals, the energy goes in two ways, which may be described as the ground wave and the sky wave The ground wave travels along the surface of the earth, gradually becoming less powerful as it spreads out over a greater area and as energy is absorbed from it

Meanwhile, the sky wave travels upward until it reaches the ionized layer of the atmosphere and then is reflected back in much the same manner that light is reflected from a mirror. A receiving station located only a short distance from the transmitting station will pick up the signal first from the ground wave, and then after an interval as an "echo" from the sky wave

A clue to the height of the ionized layer is given by clocking the time needed for a wave, which is assumed to travel with the speed of light, to hit the ionized layer and be reflected back. Reflection of waves from the ionosphere was in a sense the first radar.

Whether radio waves will be reflected by the lower ionized layer about 40 or 50 miles up, or whether they will penetrate it and continue up to some greater height and be reflected by one or another of the higher layers, depends upon the frequency or wavelength of the impulse The greater the frequency or the smaller the wavelength, the higher will the radio impulse penetrate into the ionosphere and the longer will be the time interval before the echo returns. There is, however, no echo for some extremely small waves, which pass beyond all the layers and escape into space

The maximum frequency which will be reflected by each layer, called the critical frequency for that layer, varies with the time of day, season of the year, longitude and latitude, and also with solar activity as shown in the sunspots.

In experiment stations throughout the world radio experts many times each day send into the upper atmosphere a wide range of radio waves to find the critical frequencies of the different layers This information is used to suggest the best frequency for short-wave broadcasts

To date, none of these short radio waves, escaping through the ionized layers surrounding the earth, have been known to hit a body in space and be reflected back to us It took radar waves, specially beamed to the moon, to escape through the earth's atmosphere and return Although scientists have long suspected that short radio waves did penetrate beyond the ionosphere, it was the moon that gave us our first definite proof

Science News Letter, February 2, 1946

ELECTRONICS

"Blind Navigation" Possibility of Future

➤ SHIPS AND AIRPLANES of the future may use "blind navigation" to know where they are, regardless of the weather, by using radar to take their "sights" on heavenly objects

Discovery that the layer in the atmosphere that ordinarily reflects radio waves back to earth, can be penetrated by radiation of 112 megacycles, makes it possible to pick up any heavenly body within range of the radar impulses

A rotating antenna sweeping across the heavens could locate a planet in a way similar to that used during the war to pick up enemy ships, planes and submarines The height and direction at which the planet is found would tell the navigator exactly what his position is on the surface of the earth

When used for spotting of ships or other objects on the surface of the earth, the range of radar is limited by the horizon Radar, like your eyes, can "look" only in a straight line and so cannot see around the curve of the horizon except by reflection Putting the antenna on the top of a tall tower helps to see farther just as sending a lookout to the top of the ship's mast helps him to see farther

But the horizon does not limit range when you are sending your radar message to the heavens The only thing that limits range is the strength of the impulses You could use radar to sight on the farthest star provided your antenna were sensitive enough to pick up the faint echo that comes back

For "blind navigation" through dense clouds it would be necessary to work with a wavelength that will penetrate thick layers of moisture Some wavelengths are screened off by heavy clouds However, it should be possible to find a wavelength that will go through them There may also be an engineering problem involved in making the necessary sending and receiving apparatus compact and light enough to be carried on a ship or a plane

The navigator who makes use of radar will have to learn to take his bearings from objects he has not been using in the past The bright stars used in ordinary navigation are extremely distant, and it would take years or centuries for the echo to come back For radar navigation, it would be better to sight on the moon, the sun or the planets, which are only seconds distant, as radar-waves fly

Science News Letter, February 2, 1946

AERONAUTICS

High-Flying Data Win Octave Chanute Award

➤ THE OCTAVE Chanute award for 1945 was presented at the victory dinner on Jan 28 of the Institute of the Aeronautical Sciences in New York, to Robert T Lamson and A Elliott Merrill for obtaining at great personal hazard data contributing to the design of high-altitude military aircraft Specifically, their flight research contributed to the success of high-altitude, daylight precision bombing with B-17 airplanes in Europe

The award is in honor of Octave Chanute, an engineer who gave assistance to the Wright Brothers in their early work

Science News Letter, February 2, 1946

Starfish are a pest in commercial oyster beds, one has been known to eat more than 50 oysters in six days.

ELECTRONICS

Echoes Off The Moon

Specially designed radar was used in the contact with the moon. Pulses of high frequency were shot into space and their echoes were detected seconds later.

See Front Cover

➤ MAN HAS actually contacted the moon Radio waves, according to the War Department, have gone beyond our atmosphere to the moon and been reflected back to us, travelling an estimated 477,714 miles in all

This first contact with the moon was made on Jan 10 by Army Signal Corps scientists at the Evans Signal Laboratory, Belmar, N J Specially designed radar was used which shot pulses on very high frequency energy out into space and detected their echoes seconds later The picture on the front cover of this SCIENCE NEWS LETTER shows the antenna used by the Army Signal Corps to make the contact with the moon

Announcement of this first proof that radio waves can penetrate beyond the earth's atmosphere was withheld until the Signal Corps was certain beyond doubt that the experiment was successful The results achieved have been painstakingly verified Several subsequent efforts to contact the moon have also been successful

Radar pulses, like radio waves, travel at the speed of light—186,000 miles a second It took about 2½ seconds for the radar pulses to speed from the station to the moon and the echoes to travel back to the station The distance between the moon and the earth, which varies as the moon revolves and moves in its orbit around the earth and they together travel around the sun, is calculated to average about 238,857 miles

The Signal Corps experiments are expected to have "valuable peacetime as well as wartime applications" One obvious possibility is the radio control of long-range jet—or rocket-propelled missiles, circling the earth above the stratosphere The German V-2 missiles already are believed to have reached an altitude of 60 miles

Radar might eventually be developed to the point where it can be used by astronomers to map the surface of the moon far more accurately than is at present possible Radar may also help in constructing detailed topographical maps of distant planets and in definitely determining whether life, such as we know it, exists on any of them It might conceivably be used in getting data concerning the composition and atmosphere of other celestial bodies

The primary significance of the Signal Corps achievement is that this is the first time scientists have known with certainty that a very high-frequency radio wave sent out from the earth can penetrate the electrically charged ionosphere

In connection with wartime applications of radar, the Signal Corps has been studying for several years the problem of reaching other celestial bodies with radar The experiments were directed by Lt Col John H Dewitt, Jr, former director of the Evans Signal Laboratory

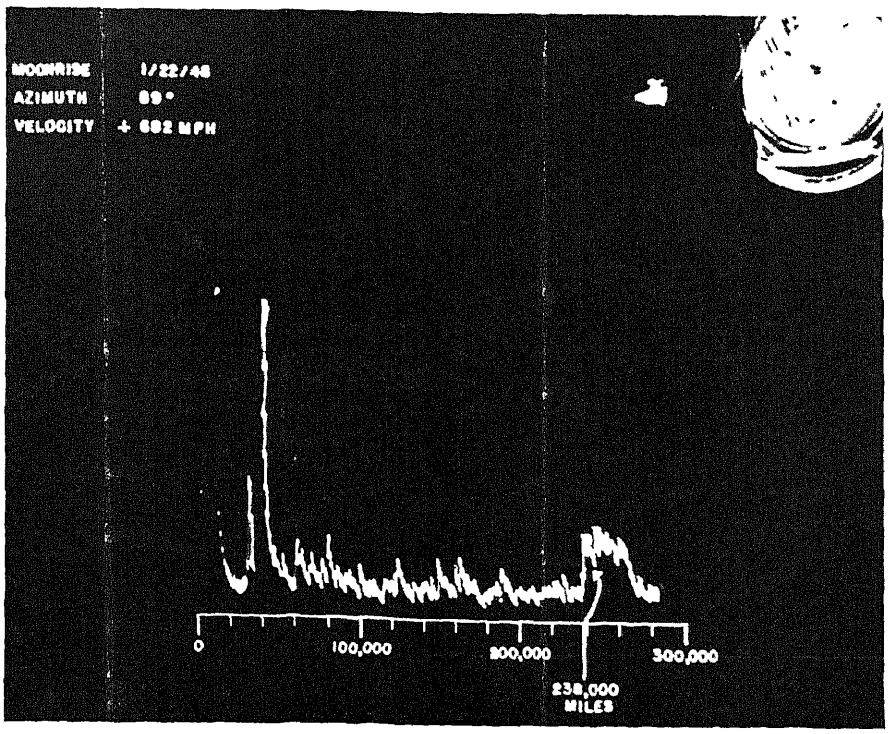
The equipment used for this experiment comprised extensive adaptations to a standard wartime Signal Corps radar, originally designed in 1937 for long-range early warning against enemy air attack

The radar was operated at its standard frequency of 112 megacycles—its alternating-current radio waves made 112,000,000 complete cycles per second—but the pulse repetition rate and pulse width were extended beyond the usual standards Instead of sending out several thousand spaced pulses each second the modified radar transmitted a pulse only every five seconds. The pulse width was increased from a few billionths of a second to as much as one-half second

A specially designed high persistency oscilloscope, comparable to the "A-scope" used on wartime radars, was constructed to present visual evidence of the moon echoes When the radar was operating, a line across the face of the tube represented the transit of the successive pulses As each pulse left the transmitter, a tall "pip" appeared at one end of this line A smaller pip, toward the other end of the line, represented the pulse echo received from the moon

A double-sized antenna with 64 instead of the standard 32 dipoles on a 100-foot tower was used

Science News Letter, February 2, 1946



RADAR SCOPE—Shows the start of the impulses toward the moon and then reflection from it. Between the start and finish of impulses is a three-second interval, with contact made after two and a half seconds. First upswing (left) of the line indicates start, while tiny pips are the result of minor interferences. Photographs by Acme.

ELECTRONICS

Outer Space Radio Hiss

Cosmic hiss first radio impulses received from outer space in 1932. Radio mystery antedated radio echoes from moon by over dozen years.

➤ THE RADIO WAVES bounced off the moon in the Army's radar experiments are not the first radio waves to arrive on earth from outer space

There is a cosmic radio hiss that seems to originate in the stars of the Milky Way or in interstellar space which Karl G Jansky, Bell Telephone Laboratories engineer, discovered in 1932 while working with an extremely sensitive receiving set This Milky Way static is probably the first radio impulse received from outer space, although the moon-reflected radar signal is the first man-made radio signal to be received on earth after a travel in outer space

The origin of this cosmic hiss is one of the problems of science that need to be solved in the future Probably the best suggestion as to its origin is that it is black-body radiation from the stars or from matter in interstellar space This idea, which means that the stuff in the stars act somewhat like a radio transmitting tube, was put forth by Mr Jansky when he was still working on the phenomenon some years ago before war research absorbed his time and energies At present, Mr Jansky, who was interviewed while attending the meeting of the Institute of Radio Engineers, is doing research for the microwave repeater systems such as that being installed by American Telephone and Telegraph Co between New York and Boston.

The interstellar static impulses are not on any one frequency but seem to be spread up and down the radio spectrum Mr. Jansky's original experiments were with a radio set tuned to about 200 megacycles Grote Reber, experimenting near Chicago, has reported in the *Astrophysical Journal* during 1945 cosmic radio impulses received on 300 and 600 megacycles

Radio engineers have been confident that radio waves travel into outer space because some radio signals are not reflected by the ionosphere layers and since they did not bounce back to earth they must have gone out into outer space

Science News Letter, February 2, 1946

ORDNANCE

VT Fuze Closely Guarded

➤ THE PROXIMITY fuze was one of the war's really secret "secret weapons", even at the close of hostilities the military chiefs of enemy countries had not found out about it

That it was one of the war's two best-kept big secrets (the other being the atomic bomb) was due in large measure to the careful precautions taken to keep any specimens from falling into enemy hands, in shells or bombs that failed to explode These security measures are outlined in a general discussion of the fuze by Col. Harold S Morton, who has worked on the fuze since 1941 (*Army Ordnance*, Jan -Feb.)

Navy shells carrying the proximity fuze, or as it is at once more technically and more briefly known, the VT fuze, were fired at enemy aircraft only over the water; the shells were never used against enemy surface craft, and they were not used against shore targets until the closing months of the war

Anti-aircraft batteries on land used VT-fuzed shells only when their targets were above ground totally controlled by Allied forces For example, when the secret of Hitler's planned V-1 buzz-bomb leaked to British information services, a special VT fuze was designed for use against it, in American 90-millimeter and British 3 7-inch rifles The firing, done entirely from British soil, was highly effective against the Nazis' jet-propelled robot weapons, but there was never a chance of even a fragment of one of the fuzes falling into Nazi hands

In the meantime, it had become increasingly apparent that the fuze would be highly effective against ground targets such as enemy troops, batteries and communications centers Fuzes for field gun ammunition were designed and built in large numbers, but they were allowed to accumulate in strategic reserves until some occasion should arise when they could be used with greatest effect

This occasion came at the famous Battle of the Bulge, the Nazis' last desperate bid for victory Artillery using shell fuzed with VT's made their fire four or five times as effective as it would have been with older-type fuzes Still the Germans failed to "get wise"—so that the inspired writer of the first report on their full use titled his opus, "They Never Knew What Hit Them"

Science News Letter, February 2, 1946

Utah, or desert, juniper, *Juniperus utahensis,* is the most abundant and widely distributed tree of the Great Basin from Idaho and Wyoming south into Arizona, it grows in dry, rocky, gravelly and sandy soils

SCIENCE NEWS LETTER

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GENERAL SCIENCE-EDUCATION

Science Talent Winners

Eleven girls, 29 boys are invited to Washington to attend the Science Talent Institute. Will receive scholarships totaling $11,000.

➤ ELEVEN GIRLS and 29 boys have been invited to Washington, March 1 through March 5, to compete for the Westinghouse Science Scholarships in the Fifth Annual Science Talent Search conducted by Science Clubs of America, administered by Science Service They will spent five days together at the Science Talent Institute in Washington

The names of the trip winners were announced by the judges as the result of a strenuous competition in which superior seniors of all secondary schools in the United States were invited to participate The 40 winners were selected from about 16,000 entrants About 3,000 of these students completed a science aptitude examination, submitted recommendations and scholarship records and wrote an essay on "My Scientific Project"

The trip winners come from 34 localities in 15 states and the District of Columbia Entries were received from every state in the union

Those who come to Washington for the Science Talent Institute in March on the all-expense trips, will compete for scholarships which will allow them to go to any college, university or technical school of their own selection to continue science or engineering training One boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships ($600 a year for four years), while 8 winners will be awarded $400 Westinghouse Science Scholarships ($100 a year for four years), and $3000 more in Westinghouse Science Scholarships will be awarded at the discretion of the judges

Selected without regard to geographic consideration, the results show that this year winners come from two states that have not had winners before. Colorado and Washington have winners this year for the first time This brings the total of states that have had winners to 32

Only three schools in the United States have produced more than one winner this year They are The Bronx H S of Science, New York, N Y, which will send four boys to the Science Talent Institute, Forest Hills H S, Forest Hills, N Y, and Andrew Jackson H S, St Albans, N Y, each sending one boy and one girl

Seven schools have been able to repeat winners The Bronx H S of Science, New York, N Y, leads, having had three winners in two previous years Next is Taylor Allderdice H S, Pittsburgh, Pa, which has produced two winners in two previous years The following have all had a winner in a previous year Bassick H S, Bridgeport, Conn, Southwest H S, St. Louis, Mo, Forest Hills H S, Forest Hills, N Y, Whitesboro H S, Whitesboro, N. Y, Eugene High School, Eugene, Oreg

Most of the winners live at home and attend their local or nearby public or parochial high schools One, however, is enrolled in a private school and goes to school in Indiana His home is in Oak Park, Ill.

About 67% of the 40 Science Talent Search trip winners rank first or second in their graduating classes, which range in size from 20 to 848 students About 15% of the winners have parents who both attended college

Most of the winners are members of science clubs and at least ten of them are presidents or hold other offices in their clubs The total number of clubs in which they work is 50, of these 31 are affiliated with Science Clubs of America

Many of the winners have chosen their fields of science study Their choices range from astronomy to aeronautical engineering Seven would prefer to get into biological fields such as medicine, pathology and surgery Twelve are choosing to enter chemistry for research or engineering A number want to be astronomers and others have chosen careers in physics, mathematics and engineering All hope to do research in their chosen fields

For the first time two winners in one family have been named Douglas Baird of Whitesboro, N Y, is the brother of Joan Audrey Baird, winner in 1944.

The judges of the Science Talent Search are: Dr Harlow Shapley, director of the Harvard College Observatory and President of Science Service, Dr. Harold A. Edgerton, director, Occupational Opportunities Service, Ohio State University, and Dr Steuart Henderson Britt, New York City psychologist The latter two are the designers of the Science Aptitude Examination made each year expressly for the Science Talent Search

In addition to the 40 winners of trips to Washington for the final competition for the Westinghouse Science Scholarships, 260 boys and girls will be named for honorable mention in the Fifth Annual Science Talent Search They will be recommended to colleges and universities for their science aptitude and, if they are as fortunate as those previously named for this honor, they will receive offers of scholarships from many schools and colleges seeking talented students

Previous winners of the Science Talent Search total 160 Most are now students in colleges and universities where they are preparing themselves for scientific careers Six have already received undergraduate degrees One is the holder of two degrees at age 20. At present 59 are serving in the armed forces—12 of them in occupation areas.

The annual Science Talent Search is conducted by Science Service as one of the activities of Science Clubs of America Awards are provided and the Science Talent Search made financially possible by the Westinghouse Electric Corporation, a leader in scientific research, engineering and manufacture in the electrical industry, as a contribution to the advancement of science

Science News Letter, February 2, 1946

ZOOLOGY

Returning Soldier Brings Wallabies, Geese, Rooks

➤ WALLABIES, hedgehogs, badgers, jackdaws, rooks, rare geese and pheasants accompanied Sgt Frederick A Ulmer, Jr, on his recent return from London Sgt Ulmer, a life member of the Zoological Society of Philadelphia and a member of the staff of the Academy of Natural Sciences, had special permission from the U S Army to make the trip with the hundred or so mammals, birds and reptiles, and deliver them safely to the Philadelphia Zoo

The animals, shipped from the London Zoo, were in exchange for a group of animals sent from Philadelphia to England to help replenish the display in the Regent's Park Zoo Much damage was caused in the famous London institution during the blitz and the buzz-bomb attacks.

Science News Letter, February 2, 1946

GENERAL SCIENCE-EDUCATION

260 Honorable Mentions Awarded in Science Search

➤ HONORABLE MENTIONS to 192 boys and 68 girls in the Fifth Annual Science Talent Search for the Westinghouse Science Scholarships have been announced by Science Clubs of America, bringing to 300 the high school seniors cited in this nation-wide selection of youth who have scientific ability

The 260 awarded honorable mentions are located in 36 states and the District of Columbia They were chosen from among some 16,000 entrants, about 3,000 of whom completed the science aptitude examination, submitted recommendations and scholarship records and wrote essays on the subject, "My Scientific Project"

All of those selected for honors will be recommended as students of unusual ability to scholarship-awarding colleges and universities

The honorable mentions in the four previous Science Talent Searches were awarded and earned scholarships amounting to more than $200 each and there is every reason to believe that the boys and girls so honored this year will qualify for valuable scholarships and other financial assistance in the colleges, universities and technical schools of their choice The judges found all 300 winners to be students of outstanding ability

Among the honorable mentions 50% of the boys and 45% of the girls were first or second in their high school graduating classes They have studied science for some years 40% of the boys have had at least four years of high school science and 28% of the girls have studied science for a similar period A larger number have studied science for three years: 41% of the boys; 41% of the girls

All the honorable mentions have crowded records of extra-curricular activities Science clubs are among the more popular activities· 156 of them belong to science clubs and 53 of them are presidents of their clubs or hold other elective offices in them

Science News Letter, February 2, 1946

Until the time of Henry VIII, according to reports, *vegetables* were not cultivated for the table

By capturing *bees* returning to their hives and stripping them of pollen collected, scientists are learning the kinds of plants the bees visited and which they prefer.

GENERAL SCIENCE-EDUCATION

40 Winners Listed

The 11 girls and 29 boys (proportion determined by ratio of boys and girls entering the contest) are being invited on all-expense trips to Washington, D. C, March 1 to 5, 1946, to attend the Science Talent Institute, where one boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships, eight winners will be awarded $400 Westinghouse Science Scholarships, and $3,000 additional in scholarships will be awarded

	CALIFORNIA
Alameda	Roemer, Elizabeth 16 Alameda High School
Los Angeles	Hummel, James Alexander 17 Alexander Hamilton High School
Mill Valley	Jones, Elaine Carlota 16 Tamalpais Union High School
Napa	Cudaback, David Dill 16 Napa Junior College
San Francisco	Shields, James William 16 St. Ignatius High School
	COLORADO
Boulder	McMillin, Patricia Ruth 17 Boulder High School
	CONNECTICUT
Bridgeport	Zirin, Harold 16 Bassick High School
Hamden	Gaines, George Loweree, Jr. 15 Hamden High School
	DISTRICT OF COLUMBIA
Washington	Hopkins, John Taylor, IV 17 Roosevelt High School
	ILLINOIS
Chicago	Kohnen, Dorothy Margaret 17 Immaculata High School
Downers Grove	Larson, Daniel Herbert 15 Downers Grove Community High School
Granite City	Johnson, Russell Dee, Jr 16 Granite City Community High School
	INDIANA
Culver	Arnold, Stephen Reynolds 17 Culver Military Academy
	KANSAS
Medicine Lodge	Kindig, Neal Bert 17 Medicine Lodge High School
Wellington	Champeny, John Charles 16 Wellington High School
	MINNESOTA
Brainerd	Widing, Kenneth Gordon 18 Washington High School
	MISSOURI
St. Louis	Kernen, Jules Alfred 16 Southwest High School
	NEW JERSEY
Garfield	Gall, Walter George 16 Lincoln High School
Upper Montclair	West, Robert C., Jr. 17 State Teachers College High School
West Orange	Newkirk, Gordon Allen, Jr. 17 West Orange High School
	NEW YORK
Forest Hills	Lewontin, Richard Charles 16 Forest Hills High School
	Raskind, Josephine Baron 16 Forest Hills High School
New York	Bush, Leon Reginald 16 Bronx H.S. of Science
	Durell, Jack 17 Bronx H S. of Science
	Schweid, Abraham Isaac 17 Bronx H.S. of Science
	Sicular, Arthur 17 Bronx H.S. of Science
	Ludwig, Gerald Wilbur 15 Christopher Columbus High School
Poughkeepsie	Sack, Seymour 16 Poughkeepsie High School
St. Albans	Cumming, James Burton 17 Andrew Jackson High School
	Karasz, Ilonka 16 Andrew Jackson High School
Syracuse	Lines, Joan Louise 17 Nottingham High School
Whitesboro	Baird, Douglas Page 16 Whitesboro Central High School
	OKLAHOMA
Tulsa	Herbert, Donald Edmonds, Jr. 17 Will Rogers High School
	OREGON
Eugene	Kingman, Alice May 17 Eugene High School
	PENNSYLVANIA
Elizabethtown	Rohrer, E. Marilyn 17 Elizabethtown High School
Pittsburgh	Shombert, Donald James 17 Taylor Allderdice High School
Villanova	Laufer, Elizabeth Ursula 17 Notre Dame Academy
	WASHINGTON
Blaine	Seely, Gilbert Randall 16 Blaine High School
Ellensburg	Gibson, James Benjamin 17 Ellensburg High School
	WEST VIRGINIA
South Charleston	Jackson, Dorothy Jean 16 South Charleston High School

CHEMISTRY

DDT Has New Competitor

Claimed to be even deadlier to some species of insects, it is a compound described as a chlorinated hydrocarbon, named Velsicol 1068.

➤ DDT HAS a new competitor in the insect-killing business, claimed to be even deadlier to some species It is a compound described as a chlorinated hydrocarbon, to which the trade name Velsicol 1068 has been given The number 1068 affords a hint as to its composition it contains 10 atoms of carbon, six of hydrogen and eight of chlorine to the molecule, giving it the empirical formula $C_{10}H_6Cl_8$ This of course gives no clue to the actual structure of the molecule, for the same assortment of atoms could be arranged in many different ways

The new insecticide was compounded in the laboratories of the Velsicol Corporation of Chicago, which will manufacture and market it as an ingredient for sprays, insecticidal paints, etc Laboratory and field tests on a limited number of insect species have been conducted by three entomologists, Prof C W Kearns and Prof Lester Ingle of the University of Illinois, and Robert L Metcalf of the Tennessee Valley Authority

Prof Kearns states that the new compound has been found from three to four times as toxic to houseflies as DDT, twice as toxic to potato beetle larvae and to pea and spiraea aphids It was about equal to DDT and the British insecticide known as Gammexane in its deadly effects on the "wigglers" of the most common of the malaria-carrying mosquitoes *Anopheles quadrimaculatus*

Precisely measured dosages of 1068 and DDT applied externally to adult American cockroaches revealed 1068 to be approximately three times more toxic than DDT to this particular insect, Prof Kearns continues Measured quantities fed to adult grasshoppers indicated that 1068 is between five and 10 times more deadly, weight for weight, than DDT, also that it is from two to four times more poisonous to grasshoppers than Gammexane

Volatility tests showed that 1068 is intermediate between Gammexane and DDT in its evaporation rate, so that it can be expected to last longer than the British poison but not so long as DDT when used in paints or as a residual spray.

Thus far, Prof Kearns adds, "little information has been obtained as to the effect of 1068 on plants and animals other than insects"

Science News Letter February 2, 1946

GENERAL SCIENCE-EDUCATION

AAUW Study Grants

Girls who led underground forces, helped resistance movement in Nazi-occupied countries now studying in United States with AAUW aid.

➤ A YOUNG WOMAN leader of underground forces in Norway during the Nazi occupation, another who aided refugees escaping to Sweden, a third who secretly taught classes in astronomy after the Nazis forced the University of Brussels to close, are among six young women now studying at colleges and universities in this country with aid from the International Study Grant program of the American Association of University Women in Washington, D C.

Most dramatic of the stories of these young women told by the AAUW is that of 25-year-old Miss Anne Sofie Oestvedt, who is now studying the chemistry of foods at the University of California at Berkeley, preparing to do much-needed nutrition work in Norway.

Miss Oestevedt was second in command of 3,000 underground workers in Norway She was hunted so intensively by the Germans that she had to take on a disguise so complete that her own father, standing next to her in a street car, did not recognize the young brunette as his former blonde daughter.

Hiding from the Germans since 1942, Miss Elsa van Dien, of Holland, nevertheless continued her scientific studies and was able to complete most of her thesis Now enrolled at Radcliffe College, she is studying astronomy at Harvard Observatory and fulfilling the hope she never gave up of "joining USA student life" She had been awarded a fellowship to study in the United States in 1939 but could not accept it because of the outbreak of the war

Also a student at Radcliffe and Harvard Observatory is Miss Simone Daro, of Belgium, who taught classes organized secretly by the underground after the University of Brussels closed

Miss Karen M Dannevig was another candidate chosen from among forty Norwegian applications for AAUW Study Grants When occupation by the Germans interrupted her work at the University of Oslo, she worked first with the secret military organization in arranging the flight of refugees to Sweden and allowed her rooms to be used for instructing refugees, thus risking arrest and confiscation of her belongings When her rooms were finally taken by the Gestapo, she worked as a coder of secret messages and as secretary to the leader of the Norwegian Home Forces She is now studying American literature and history of the arts at Radcliffe College, preparatory to teaching English

When an AAUW Study Grant was given to Miss Elizabeth Jansma of Holland last fall, the U S Ambassador to the Netherlands helped her to get passage to this country as the only passenger on a Liberty Ship. Her father, a well-known liberal, was one of the first group arrested by the Germans. A graduate of a "gymnasium" for girls, Miss Jansma is enrolled at Sweet Briar College, Virginia

Miss Cecile Rabut of Paris, France, who has been a practicing advocate since graduating from the law school of the University of Paris, received the AAUW Study Grant to make a study of the problems of juvenile delinquency as handled by courts and correctional agencies in this country After study at the New York School of Social Work, she will observe American methods in juvenile courts and institutions in the South and Middle West, under a schedule planned by the U S Children's Bureau She will report to French authorities upon her return with a view to helping solve problems of delinquency which have reached alarming proportions in France

The American Association of University Women will bring another group of women students to the United States next fall.

Science News Letter, February 2, 1946

GENERAL SCIENCE

GI Collectors Benefit U. S. National Museum

➤ SOUVENIR-HUNTING, the mark of American GIs everywhere, sometimes serves a more serious and permanent purpose than just collecting miscellaneous trophies wherewith to impress the girlfriend and the folks back home At the annual meeting of the Smithsonian Institution's board of regents in Washington, D C, Dr Alexander Wetmore, secretary of the Institution, reported on substantial and valuable additions that have been made to the scientific collections of the National Museum by members of the armed forces serving overseas, especially in Asia and the Pacific area

Some of the small mammal specimens sent in from the Indo-Pacific region are of species hitherto unrepresented in the Museum A collection of nearly 600 birds came from Panama, 500 from Ceylon and about 100 from the Admiralty islands Most important of the year's insect accessions was the large amount of mosquito material received from various units of the Army and Navy

Among the Museum's wartime acquisitions in the field of cultural anthropology was a large model of an outrigger canoe from Tarawa and a royal Hawaiian cape made of red, yellow and black feathers. Gen H. H Arnold deposited on loan an Arab costume presented to him by the King of Saudi Arabia

Outstanding among new engineering exhibits will be the first jet-propelled airplane built and successfully flown in the United States

Dr Wetmore announced the initiation of plans for the celebration of the hundredth anniversary of the Smithsonian Institution, which will be held next autumn.

Science News Letter, February 2, 1946

LANGUAGE

New Book Bridges Gap Between English and Aleut

➤ A NEW BOOK, titled *The Aleut Language,* which bridges the gap between English and the language spoken by the native of the Aleutian islands, has been published under sponsorship of the Department of the Interior It contains a grammar and an English-Aleut vocabulary The familiar Roman alphabet is used, but markings of some of the letters required the casting of a certain amount of special type

Although newly published, the book is in some respects old First work leading to its appearance was done between 1820 and 1830 by Ivan Veniaminov, a scholarly Russian priest The rest of the work was carried out by the late Richard Henry Geoghegan, noted Irish linguist and philologist, and Miss Fredericka I Martin of New York, who inherited Mr Geoghegan's mass of source material upon his death in 1943, and who edited the final text

Science News Letter, February 2, 1946

AERONAUTICS

Guggenheim Medal Awarded Dr. T. P. Wright

➤ THE DANIEL Guggenheim medal for 1945, and also an Honorary Fellowship in the Institute of the Aeronautical Sciences, were presented by the institute on Jan. 28 to Dr T. P Wright, U S. Administrator of Civil Aeronautics

The medal is awarded him for outstanding contributions to the development of civil and military aircraft and for notable achievement in assuring the success of the wartime aircraft production program The fellowship is regarded as one of the highest honors the institute confers on persons of preeminence in aeronautics

Science News Letter, February 2, 1946

CHEMISTRY

Process for Extracting Dandelion Rubber

➤ ALTHOUGH the end of the war has reduced the likelihood of our needing to rely on home-raised rubber-yielding plants, patent 2,393,035 has been granted to two U S Department of Agriculture scientists, R E Eskew and P W. Edwards, at the Eastern Regional Research Laboratory in Philadelphia, on a simplified method of extracting rubber from the roots of the Russian dandelions, koksaghyz and tau-saghyz The roots are first leached of their carbohydrates with hot water, then mill-crushed to a pulp or slurry, in which the rubber particles agglomerate into relatively large masses The slurry is then diluted and screened, and the rubber and adhering skins remaining on the screens are scrubbed with water. The resulting slurry is then dispersed in water and the floating rubber removed while the debris sinks

Rights in the patent are assigned royalty-free to the government

Science News Letter, February 2, 1946

BIOCHEMISTRY

Vitamins from Manure Seen as Possibility

➤ CHICKENS scratching on a manure pile may not be the most fastidious eaters in the world, but at least they have found out how to stay healthy, results of experiments at the Colorado A and M College indicate Chicks fed on a normal ration did not grow as rapidly or mature as soon as those fed on a similar ration to which 10% of dried manure was added

Biochemists at the college are now engaged in a comprehensive research program to find out what vitamins, hormones and other "trace substances" important to the health of farm animals may be in the wastes from their own bodies It has already been discovered that the manure of pregnant cows contains a high concentration of male sex hormone

Science News Letter, February 2, 1946

AERONAUTICS

B-29 Superfortress Beats Endurance Record

➤ WHAT IS believed to be an endurance record for stratosphere flight by an airplane was made recently by a B-29 Superfortress that remained at an altitude of over 40,000 feet for three hours and 38 minutes Announcement of this record was made by the Army Air Technical Service Command at Wright Field, Ohio

The Superfortress used was especially equipped as a pressurized flying laboratory, and scientists aboard accumulated much data which will be of use to aviation engineers in designing high-flying planes, and which are to be made available to the aircraft manufacturing industry as a whole.

The record was made in conjunction with high-altitude flights being conducted by the Boeing Aircraft Company and the Air Technical Command to test various types of equipment for future stratosphere bombers Previously a B-17 was used in these tests The B-29 was substituted because it offers better operational conditions, and can be pressurized and heated to withstand the stratosphere.

Science News Letter, February 2, 1946

BOTANY

Botanical Classic Now Published for General Use

➤ A GREAT but little-known work on plants, written in the late middle ages and threatened with loss to the world of science by World War II, has now been made generally available for the use of botanists through publication in modern book form It is the *Herbal* of Rufinus, an Italian monk, who completed the manuscript near the close of the thirteenth century

The original manuscript is lost, and only one copy, made at least a century after the first writing, survives in the Laurentian Library at Florence—that is, it is still there if mishaps of the late war did not destroy it A photographic copy was in the hands of a noted student of the history of science, Prof Lynn Thorndike of Columbia University, before the war. He has edited it, and it has now been published by the University of Chicago Press

Like all medieval and early modern herbalists, Rufinus concerned himself primarily with the medicinal values of his plants But unlike other early herbalists, who took it for granted that everyone knew all plants at sight, Rufinus describes his species very exactly—so much so that present-day botanists can tell what plants he was writing about

One thing stands in the way of easy use of the new Thorndike edition by all American botanists—the text is in the original Latin However, medieval Latin, while less elegant than the classic language as written by Cicero and Vergil, is also less involved in its grammar. Anyone with a couple of years of high-school Latin should be able to read this book

Science News Letter February 2, 1946

AERODYNAMICS

German Supersonic Wind Tunnel Now in America

➤ A GERMAN supersonic wind tunnel for research in aerodynamics will soon be set up and used by the Navy at the Naval Ordnance Laboratory in White Oak, Md Its parts were received late in 1945, and German scientists and engineers are being brought to this country to assist in its installation and initial operation It was formerly used at the German Aerodynamic-Ballistic Research Establishment at Kochel, where work in the development of the Nazi V-weapons was carried on.

This wind tunnel is of unusual interest because, according to the Navy, it includes equipment that has never been duplicated outside of Germany It includes the world's largest interferometer, which measures air density by optical means.

A total of 13 German scientists and engineers, experts in the field of aerodynamics and formerly associated with the Kochel establishment, are being brought to the United States under contract for a limited period The Navy will furnish them with quarters and meals Their salaries will be sent to their families in Germany They will arrive under escort, and will be admitted to the country as disarmed aliens and not as prisoners of war

Science News Letter, February 2, 1946

FISHERIES

Jap Oyster Invasion Threatens Eastern Coast

➤ WARNING against the dangers of a possible Japanese invasion of the Atlantic seaboard of the United States has been sounded

No, this isn't February, 1942, it's still February, 1946 The Japs that may get into our seacoast waters if we don't watch out are the big Japanese oysters, already cultivated for commercial purposes on the Pacific coast They're all right for those waters, for the Pacific coast didn't have any big oysters of its own, until seed oysters were imported from Japan and planted there some years before the war New shipments of seed oysters are now expected from the same source, to replenish the beds

However, the U S Fish and Wildlife Service warns Eastern oyster "farmers" against setting Japanese oysters in their beds While the Oriental shellfish is acceptable in lack of a better, it is not the equal of the eastern American oyster in either flavor or appearance Moreover, it is a veritable weed among oysters, and its prolific growth might drive out the native species, or it might ruin its quality by hybridizing with it

Finally, Dr. Paul S Galtsoff of the Service warns, the Japanese oyster drill, a predatory snail that is a deadly enemy of oysters, could easily be introduced into Eastern oyster beds, and if it is the effects will be ruinous

Science News Letter, February 2, 1946

ASTRONOMY

Gives Direct Position Readings of the Stars

➤ A NAVIGATIONAL apparatus that requires no calculations on the part of the observer, and calls for no use of sextant or other "star-shooter," is the unique offering of Carl J Crane of Sacramento, Calif, who has received U S patent 2,393,310 on his invention

The device combines the principles of camera obscura and planetarium It consists essentially of a closed chamber divided horizontally by a sheet of ground glass or other translucent substance In the middle of the top is a lens combination that catches the images of star groups and projects them on the upper surface of the ground glass Underneath is an internally lighted small sphere, pierced with pinholes in the positions of the principal fixed stars, and mounted with a set of graduated rings that permit settings for calendar date, chronometer time, etc The pinhole points of light from the openings in the sphere are projected against the lower surface of the ground glass When the actual star images from above and the artificial ones from beneath are in exact agreement, the position of ship or plane carrying the instrument can be read off directly on a final graduated circle

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Science News Letter, February 2, 1946

AERONAUTICS

Nylon Hoop Lands Planes on Tiny Islands

➤ NO ISLAND or area on the globe will be too small or remote for air transportation with use of the simple Brodie system for landing planes off the ground The system, invented by Capt James H. Brodie, permits small aircraft to land on ships only 300 feet long and on land where only a 500-foot treeless area is accessible.

During the Okinawa campaign liaison planes landed on small ships by hooking onto a nylon hoop suspended from a trolley cable stretched between two booms on the boat Important reconnaissance, direction of naval fire, evacuation of wounded men, and replenishment of ammunition supplies were thus possible

Landings may now be made not only on ships but on islands and in rugged areas where regular landing fields are impossible or too costly.

Science News Letter, February 2, 1946

MEDICINE

Medical Heroes

Members of the medical corps of all services, officers and enlisted men alike, won six per cent of all decorations for service beyond the call of duty.

By HILLIER KRIEGHBAUM

➤ THE MEN of mercy—the doctors and enlisted men of the medical corps—were heroes, too

A survey of Army and Navy records today shows that when the awards and decorations were presented for acts of bravery during World War II, the medical men had matched and in some cases surpassed their comrades in arms

In his final report on the war, General of the Army George C Marshall said that 6% of all decorations given for meritorious service and gallantry went to medical department personnel It was the same in the Navy

For example, the Congressional Medal of Honor, highest award that a grateful nation can bestow on its wartime heroes, was given to six Army "medicos" and to three Navy corpsmen That meant a total of nine out of the slightly less than 350 medals awarded for transcending heroism This figure compares favorably with the proportion granted to the fighting men

North and south, east and west—all sections of the country were represented by these elite of medical heroes Some were farm boys who had never left their home communities except for brief excursions to nearby cities until they joined the armed services and were sent to distant battlefields One had been a conscientious objector And one, as if in answer to Noel Coward's facetious slur, came from Brooklyn, N Y

First to Win Honor

Lloyd C Hawks, who came from Park Rapids, Minn, was the first from the medical corps to win the Congressional Medal of Honor Then there was Harold A Garman of Albion, Ill., who plunged into the Seine River through a hail of machine gun bullets to rescue three wounded men stranded in an assault boat, Thomas J. Kelly of Brooklyn, who ten times went through brutal machine gun fire to rescue wounded men of his unit; and Alfred L Wilson, of Fairchance, Pa., who gave his life in an attempt to treat wounded infantry comrades under shell fire

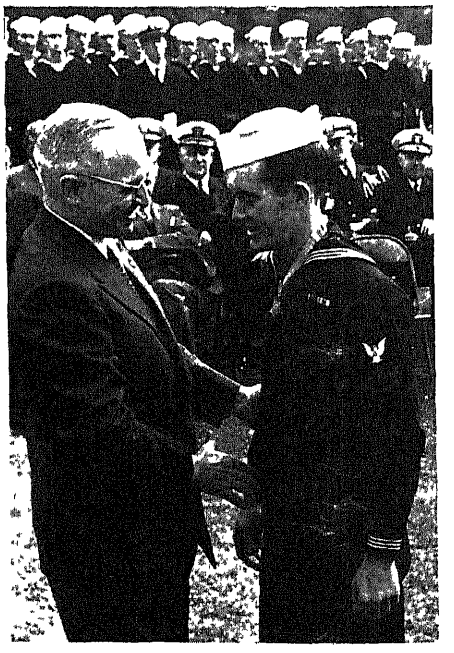
The bloody fields of Iwo Jima and Okinawa were the scenes for all three Navy incidents Robert Eugene Bush, a 19-year-old Navy hospital apprentice, helped fight off a Japanese counterattack while giving a blood transfusion to an injured Marine officer in a shell hole George Edward Wahlen of Ogden, Utah, continued through enemy gunfire repeatedly on Iwo Jima until, on March 2, he crawled to aid a fellow comrade despite his own injuries so serious he could not walk John Harlan Willis of Columbia, Tenn, was killed when a Jap hand grenade exploded in his hand after he had hurled back eight others as he administered blood plasma to a wounded Marine in an Iwo Jima foxhole

Two of the Army awards were won in the Pacific area Desmond T Doss of Lynchburg, Va, after repeatedly staying in fire-swept areas on Okinawa, crawled off a litter when wounded himself to aid a more seriously injured man Laverne Parrish of Ronan, Mont, won a posthumous medal for bravery while administering to wounded soldiers in the Southwest Pacific.

The story of Hawks, who still was on crutches when the blue and white ribbon of the Congressional Medal of Honor was pinned around his neck, remains one of the thrilling dramas of the war It is simply but eloquently told in his citation

"On 30 January 1944 at 1500 hours (3 p m) near Carano, Italy, Private First Class Hawks braved an enemy counterattack in order to rescue two wounded men who, unable to move, were lying in an exposed position within 30 yards of the enemy Two riflemen, attempting the rescue, had been forced to return to their fighting holes by extremely severe enemy machine gun fire after crawling only 10 yards toward the casualties An aid man whom the enemy could plainly identify as such had been critically wounded in a similar attempt Pfc Hawks nevertheless crawled 50 yards through a veritable hail of machine gun bullets and flying mortar fragments to a small ditch, administered first aid to his fellow aid man who had sought cover therein and continued toward the two wounded men 50 yards distant An enemy machine gun bullet penetrated his helmet, knocking it from his head, momentarily stunning him Thirteen bullets passed through his helmet as it lay on the ground within six inches of his body

"Pfc Hawks crawled to the casualties, administered first aid to the more seriously wounded man and dragged him to a covered position 25 yards distant Despite continuous automatic fire from positions only 30 yards away and shells which exploded within 25 yards, Pfc Hawks returned to the second man and administered first aid to him As he raised himself to obtain bandages from his medical kit his right hip was shattered by a burst of machine gun fire and a second burst splintered his left forearm Displaying dogged determination and extreme self-control, Pfc Hawks, despite severe pain and his dangling left arm, completed the task of



HIGHEST AWARD—During October President Harry S. Truman presented the Congressional Medal of Honor to PhM 2/c G. E. Wahlen, USNR.



REAL HEROES—These men received the highest award of our country for service beyond the call of duty. Top, left to right: Sgt. Thomas J. Kelly, Hospital Apprentice 1/c R. E. Bush, Pfc. Desmond T. Doss, AUS, Pvt. Harold A. Garman. Botton· Pfc. Lloyd C. Hawks, USA, received the Medal of Honor from the late President Roosevelt. Official U. S. Army and Navy photographs.

bandaging the remaining casualty and with superhuman effort dragged him to the same depression to which he had brought the first man Finding insufficient cover for three men at this point, Pfc Hawks crawled 75 yards in an effort to regain his company, reaching the ditch in which his fellow aid man was lying"

The 19-year-old Bush of Raymond, Wash, braved many artillery, mortar and machine-gun fire on Okinawa to administer to the wounded falling under murderous Japanese barrages Despite a Jap counterattack, he continued to administer life-giving plasma to a wounded Marine officer.

Bush's citation tells the rest of the story as follows

"With the bottle held high in one hand, Bush drew his pistol with the other and fired into the enemy's ranks until his ammunition was expended. Quickly seizing a discarded carbine, he trained his fire on the Japanese charging point-blank over the hill, accounting for six of the enemy despite his own serious wounds and the loss of one eye suffered during his desperate battle in defense of the helpless man

"With the hostile force finally routed, he calmly disregarded his own critical condition to complete his mission, valiantly refusing medical treatment for himself until his officer had been evacuated and collapsing only after attempting to walk to the battle aid station"

While all the Congressional Medals of Honor were given to enlisted men of the medical corps, thousands of doctors have been cited for conspicuous bravery Countless others performed their deeds of valor but went unrewarded with any award or decoration

Army figures for the European theater of operations are the only ones now available in a formal report because those from the Pacific have been slower in being tabulated

In addition to the Congressional Medals of Honor, this tabulation showed 97 awards of the Distinguished Service Cross, the Army's second highest medal for distinguished bravery, 217 of Legion of Merit and 2,849 of the Silver Star The Bronze Star was the most frequent of the combat awards to the medical personnel with 13,779 going to enlisted men, 2,716 to officers and 322 to Army nurses Clusters to the Bronze Star for additional valor were awarded to 1,117 individuals

Army nurses received a total of 572 awards, including 237 Air Medals or clusters for bravery in the air Seventeen nurses were awarded the Purple Heart, one was taken prisoner, and four were killed in action

100 Navy Crosses

The Navy's figures are not expected to be completely tabulated for many months but an officer in the Bureau of Medicine and Surgery estimated that approximately 100 Navy Crosses had gone to doctors and corpsmen

Doctors unwittingly were caught in the midst of battle as lines swung back and forth An example from the dozens to pick from is the surprise dawn attack by Japanese down a road leading to the Third Marine Division hospital on Guam Although the 25 Japs were flanked by snipers and machine gunners on the hillsides, they infiltrated toward the medical corps' tents Despite rifle fire, the enemy charged, yelling, "Yip yip" Patients fled, clad only in brief hospital smocks or in blankets

Surgeons were operating in the initial daylight when a Jap mortar ripped through their tent in the middle of the camp site Lt -Comdr Clarence C Piepergerdes, of Bisbee, Ariz, organized a group of pharmacist's mates and marines. He led them so effectively that the advance toward the hospital area was halted The group held a defensive position on the right flank until division reserves could relieve this motley army.

When presented the Silver Star medal, Comdr Piepergerdes received a citation which praised his action, which had "undoubtedly saved the lives of wounded patients, prevented panic, and inspired others who observed him"

Army counterpart of Comdr Piepergerdes was Maj Reuben K Pliskin, an Akron, O, surgeon in civilian life, who was ordered to move his hospital group to the rear during the campaign on Mindanao. In his case, too, the Japs infiltrated through the American lines and overtook the caravan which had been held up by a destroyed bridge as it moved to a rear area (*Turn to next page.*)

Do You Know?

Ginger is one of the few spices obtained from roots

The *clove tree*, source of the well-known spice, is an island tree that is said to require salt air.

There are about 13 *penicillin-producing* establishments in the United States and Canada, representing an investment of some $20,000,000

Small portable *turbine*, reported developed and in use in Russia, requires only about two cubic meters of water a second to operate and can furnish electric light for 600 homes

A few of the *snowy owls* of the Arctic region visit northern United States each winter, but when food is very scarce thousands come south, sometimes as far as North Carolina.

When a jumping *spider* leaps from a perch, a safety line emerges from its spinnerets which hardens on exposure to the air, if it misses its objective, it can haul itself back to the perch by the line

Electric plants under the U S. Department of the Interior during the year ended June 30, 1945, generated nearly 9% of the total American output of electrical energy

Pre-packaged fresh meats, fruits and vegetables will soon become common in food stores, protection against contamination, loss of weight, bruising and spoilage are promised by pre-packaging

The *agate stone* logs found in the Petrified Forest in the southwestern United States were tree logs millions of years ago, into whose cell cavities and intercellular spaces silica in solution and other minerals entered.

Nitrogen, the chief growth-producing stimulant in the soil, is responsible for the hardy stem and leaf; with a lack of nitrogen, these characteristics are absent; with too much, the plant runs to foliage and not to fruit

Spices are obtained from the buds, leaves, seeds, bark, roots and berries of tropical aromatic pungent plants; seasoning herbs are obtained usually from the leaves of temperate-zone annual or perennial plants.

Here is Maj Pliskin's description of the encounter in which he received 14 bayonet and saber slashes

"The Nips came down the road We could see them faintly because of the burning truck First we heard footsteps, then we could see them About 15 feet away from me, a stream of fire came at me from the bank at the side of the road. I used my 45, and I guess I got the Nip There were two more, one in front, one to the right The one in front opened up, and I emptied my pistol at him The third man attacked

"I threw my pistol, probably stunned him, and we started to tussle Then two more moved up, and began to jab at me with a bayonet as I struggled The third stab cut my wind-pipe and I fell back I don't know how long I was unconscious When I came to, I rolled into the ditch, under the brush, I stuck a handkerchief into my face wound, and lay face down The Nips came back, blowing up trucks Five or six were burning, and the grass was afire Luckily, the area around the truck nearest me didn't catch fire

"About 1 a m , our troops came back, and started to drive away the trucks that could still move I yelled at them They refused to come in, thinking I was a Nip and I had to crawl out A corporal in my outfit recognized me Our troops took care of me."

Even behind enemy lines, American medical men performed their life-saving duties A Bronze Star medal went to Lt Joshua P Sutherland of Hays, Va , for his work in the German Stammlager IX B Prisoner of War camp from December, 1944, to April, 1945.

Although entitled to live in officers' quarters after he was captured, Lt Sutherland voluntarily remained at the enlisted men's camp when he realized that the Nazis did not intend to give sick and dying American enlisted men any medical attention He was medical officer for some 3,000 men and had to work in filthy and louse-infected rooms.

When the Nazis planned to evacuate the camp's prisoners by forced marches, the doctor convinced them of dire consequences that could follow such a plan Thus he delayed the proposed move long enough for United States troops to reach the camp and liberate the prisoners.

Science News Letter, February 2, 1946

METEOROLOGY

Typhoons Were Hunted

Data on position, course and violence of storms sent in by American airmen in the Pacific were of immense value in sea and air operations.

➤ AMERICAN AIRMEN flew out hunting typhoons, which rate as the world's worst weather, during the closing months of the Pacific campaign When a typhoon was found it was tracked by these determined and daring weather scouts as if it were a hostile force—which indeed it was Data on position, course and violence of the storm, radioed to island bases and fleets at sea, were of immense value in operations

The daring work of these weather-chasing flyers, unpublicized during the war, has been made known by the Navy Department.

Three types of four-engined land-based bombers were used in the typhoon reconnaissance They were all given extra fuel capacity to enable them to make flights of thousand-mile radius No extra oxygen was carried, and flights were all made at low altitude—frequently hundreds of miles at less than 1,000 feet above the waves Ditching and parachuting were out of the question because the water was always impossibly rough And many of the flights had to be made over waters then dominated by the enemy

Two kinds of operational flights were regularly made One was a questing flight over a given course, searching wide areas for possible typhoon conditions Once a typhoon was found in action, planes followed it regardless of area boundaries, keeping track of it day after day, until it had blown itself out Half-hourly reports were radioed to the base, giving the plane's position and present weather A full verbal report was given by the aerological observer upon return to base. All reports received urgent precedence and were rushed by radio to all commands operating near the storm

Setting up typhoon reconnaissance as a regular Navy aviation job was determined upon as a result of rough experiences of American forces at sea and in

the air in a typhoon southeast of Okinawa on June 5, 1945 Regular flights, begun soon after that date, were continued until Nov 15 In all, 345 such typhoon reconnaissance flights were made

Weather research as well as weather scouting will become part of the flyer's job beginning in March, when Army and Navy air forces, under the scientific direction of the U. S Weather Bureau, will fly remote-controlled, pilotless planes into the hearts of the worst thunderstorms they can find, to learn more about these storms, rated about worst of weather hazards that aircraft have to encounter in temperate regions

The research will be conducted at the huge air installation of the Army Air Force at Orlando, Fla, and at the Naval Air Station at Banana River in the same state The robot planes will carry instruments to record all that happens to them in their trouble-seeking flights, and they will be watched and controlled from "laboratory" planes flying at a safe distance from the dangerous thunderheads

Several other organizations will collaborate, conducting research along special lines Among them will be the National Advisory Committee for Aeronautics, the Soaring Society of America, the Massachusetts Institute of Technology, the University of Chicago and the University of New Mexico

Science News Letter, February 2, 1946

CHEMISTRY

Vitaminized Fertilizer From Pulp-Mill Waste

➤ WEALTH from waste, always a fascinating topic in the annals of American industry, finds a new exponent in a New York inventor, Eric W Eweson, who has been granted U S patent 2,392,811 on a fertilizer made by culturing masses of yeast cells in sulfite liquor, a most objectionable effluent from woodpulp and paper mills

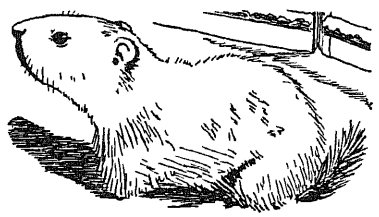
To prevent development of too much alcohol, Mr Eweson bubbles quantities of air through the sulfite liquor while the yeast cells feed on the wood sugars dissolved in it, and on the mineral salts which are introduced. After the yeast has reached maximum growth, the mass is dried and sacked, ready for use

The inventor claims that his fertilizer contains vitamins and still-living yeast cells, the excess of nutrient salts not used by the yeasts, and the lignin, the latter serving as a valuable soil conditioner

Science News Letter, February 2, 1946

ZOOLOGY

NATURE RAMBLINGS by Frank Thone



Deputy Forecaster

➤ THE GROUNDHOG, whose shadow-gazing on Candlemas Day (Feb 2) is supposed to determine the character of the weather for the ensuing six weeks, serves in this country as deputy for the European hedgehog, which was really the original object of the quaint superstition Early settlers from western Europe, finding no hedgehogs here, picked out the next likeliest animal, which happened to be the groundhog, or as he is also known, the woodchuck

Actually, the groundhog isn't at all a good substitute for the hedgehog Zoologically he is not at all closely related, for he is a rodent, whereas the hedgehog is an insectivore, belonging to the same group as moles and shrews The two animals do not even look much alike the hedgehog is considerably smaller, and has a back-armor of spines like a porcupine, except that they are only an inch long

The groundhog would be a most unwilling deputy for the hedgehog if he could be conscious of the dubious honor that has been thrust upon him, for he is a hearty sleeper and hates to get up so early in the year The hibernating period of the groundhog, over most of his range, runs well into March, St Patrick's Day would be a much more appropriate feast than Candlemas, to set for his first tentative emergence from winter quarters The hedgehog, in the much milder winters of western Europe, and especially of the British isles, sleeps lightly and may be seen rummaging around in the underbrush on almost any warm day in winter, like some of our own squirrels

There is a European animal that is a very close cousin of our American groundhog; it is known as the marmot, which is the more dignified common name of the groundhog as well It is also the scientific name, the full zoological title of the common groundhog of the eastern United States is *Marmota monax* A Western marmot, that lives amid the tumbled rocks of the mountains instead of in the woods, is appropriately known as rockchuck instead of woodchuck

Science News Letter, February 2, 1946

ENGINEERING

Gas Turbines to Give Much More Power

➤ WAR-BORN gas turbine engines can be used in future transport planes and will give nearly half again as much power with the same engine-weight as prewar reciprocating engines, declared R. P Kroon, Westinghouse engineer, at a meeting of the Institute of Aeronautical Sciences in Washington, D C Or, he continued, use of such engines can save approximately 25% of installed engine weight and permit greater fuel capacity for long-range flights, or greater payloads on shorter trips

These economic advantages, he pointed out, will be achieved through the compactness of the gas turbine, the small diameter and low frontal area of which enable a great amount of power to be packed into a small space with relatively light weight.

"Gas turbine engines," he said, "whether equipped with a propeller drive or depending upon a jet for power, can easily be installed in the wing of a large airliner with a considerable reduction in air resistance as compared with a regular reciprocating engine"

Science News Letter, February 2, 1946

A blind species of *salamander* is found almost exclusively in Missouri caves.

Like acids, the enzyme *invertin* found in many plants and yeasts changes cane sugar into a mixture of glucose and levulose.

THE SCIENTIST IN ACTION by W. H. GEORGE
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PHYSICS-BIOLOGY

Atom Bomb Blast Effects

Will probably kill and stun fish in the Bikini lagoon. May also start a local tidal wave to wash over the islands.

➤ ATOMIC BLASTS that will destroy and damage guinea-pig ships in the lagoon of Bikini atoll next May and August will make Friday dinners very cheap for a while The terrific concussion, even from the bomb that will be exploded in the air, will undoubtedly kill all fish for a considerable area, and stun others for miles around And when the second bomb is exploded at the surface of the water the effect will be even more severe, because of the absence of any air cushion

Not only the many-colored tropical fish and sharks will be the victims of the concussion, other sea life on the bottom, such as octopuses and squid, lobsters and crabs, will feel the effects How much the blast will affect lower types of marine animals, like sponges and coral polyps, will remain a problem until after the event, in general, these humbler forms of animal life can take a terrific battering and then regenerate themselves

How much effect there will be from the heat released by the explosion is another problematic matter Very likely, however, only a relatively small volume of water will be turned to steam, for water has a most amazing heat-absorptive power So while some of the fish may come up ready-cooked, or even overdone, those farther away from the center of explosion will suffer mainly from the blast

The disputed lingering radioactive effects, much discussed after the explosions in New Mexico and Japan, will mean less in Bikini lagoon Some radioactive properties will undoubtedly be imparted to the water and the salts dissolved in it, but it is unlikely to last long water flows away too soon, and becomes too mixed with unaffected water masses out of range at the moment of the explosion

The blasts, of course, are likely to kick up quite a commotion in the 20-by-30-mile, saucer-like body of shallow water within the ring of the score or so of islands that constitute Bikini atoll It is highly probable that one or more local tidal waves may be sent washing over the low islands, which are never more than a few feet above hightide mark, doing the same kind of damage that is wrought by an earthquake wave, though less than is done by the longer violence of waves driven by a typhoon Direct effect of the blast on the vegetation and land life of the islands will of course depend largely on how far off shore the bomb explosions take place

A group of biologists, particularly marine biologists, are to be included in the scientific party that will be sent to study the effects of the bombs They will not only record data on destruction to marine life but will probably be able to reap an incidental harvest of specimens otherwise hard to get, which may be killed and dislodged from their homes among the coral by the volcanic violence of the blasts Follow up studies, on both marine and land life, will be carried on for many months

Science News Letter, February 2, 1946

Land released from growing feed for horses and other work animals, now replaced by motor power, is sufficient to feed 18,000,000 head of cattle.

Narcissus fly larvae are killed by a new Dutch process in which the infected bulbs are subjected to pressure in a mixture of carbon dioxide and oxygen



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• Books of the Week •

AMERICAN NATIONAL RED CROSS, Annual Report for the Year Ending June 30, 1945—*American National Red Cross*, 209 p, charts, free A record of the accomplishments of what may well be the outstanding year in the whole history of the organization

THE CHEMISTRY OF ANESTHESIA—John Adriani, M D—*Charles C Thomas*, 502 p, diagrs, $7 Deals with the inorganic chemistry related to anesthesia, the organic chemistry of depressant drugs, and the biochemical aspects of anesthesia, including the chemical changes in tissues induced by the administration of anesthetic drugs to man and animals

HEALTH GUIDES AND GUARDS—Francis P Wall and Louis D Zeidberg—*Prentice-Hall*, 392 p, illus, $3 67 3rd edition The principles of hygiene presented in a concise and practical manner, corrects popular fallacies and explains accepted facts of health

HOWELL'S TEXTBOOK OF PHYSIOLOGY—John F Fulton, ed—*W B Saunders*, 1304 p, illus and charts, $8 15th ed In this 15th edition of a famous textbook, many new chapters have been added and others have been rewritten by the editor

THE LITTLE FISHERMAN—Margaret Wise Brown—*William R. Scott*, 32 p, illus, $1 50 A book for children charmingly illustrated by Dahlov Ipcar An accurate description of deep sea fishing as well as a delightful fantasy

MATHEMATICAL CUNEIFORM TEXTS—O Neugebauer and A Sachs—*American Oriental Society*, 226 p, diagrs and plates, $5 Devoted to the editing of hitherto unpublished Babylonian mathematical texts chiefly from American collections American Oriental Series, Vol 29

MOLLUSCA OF THE TERTIARY FORMATIONS OF NORTHEASTERN MEXICO—Julia Gardner—*Geological Society of America*, 332 p, illus and charts, $3 25 Geological Society of America, Memoir 11

PAPERS OF THE MICHIGAN ACADEMY OF ARTS AND SCIENCES Vol XXX, 1944—Eugene S McCartney and Henry Van Der Schalie, editors—*Univ of Michigan Press*, 684 p, charts and illus, $5 Papers on specialized fields in botany, forestry, zoology, geography, geology, anthropology, economics, literature, medicine and sociology

PLANNING FOR JOBS—Lyle Fitch and Horace Taylor—*Blakiston* 463 p, charts, $3 75. The suggestions submitted in the employment plan contest sponsored by the Pabst Brewing Co Material covers a wide range of views from a group of writers which includes some of America's most distinguished businessmen and economists

PRIMITIVE MONEY—H A Wieschhoff—*Univ of Pennsylvania*, 43 p, illus, 50 cents Description of monetary concepts as shown in primitive forms of currency University Museum Bulletin, Vol 11, No 3

PROTOZOOLOGY—Richard R Kudo—*Charles C Thomas*, 778 p, illus, $8, 3rd ed. A textbook presenting comprehensive and up-to-date information on the common and representative genera and species of all groups of both free-living and parasitic protozoa

THE PUEBLO INDIAN WORLD—Edgar L Hewett and Bertha P Dutton—*Univ of New Mexico Press*, 176 p, illus, $4 Studies on the natural history of the Rio Grande valley in relation to Pueblo Indian culture Handbook of Archaeological History, No 6

RADIO TEST INSTRUMENTS—Rufus P Turner—*Ziff-Davis*, 219 p, diagrs and illus, $4 50 Technical, fully illustrated descriptions

REVISION OF THE UPPER CAMBRIAN FAUNAS OF NEW JERSEY—B F Howell—*Geological Society of America*, 46 p, illus, 85 cents Geological Society of America, Memoir 12

WARRIORS WITHOUT WEAPONS A Study of the Society and Personality Development of the Pine Ridge Sioux—Gordon Macgregor—*Univ of Chicago Press*, 228 p, illus, $3 75 What the decline of the Sioux Indians has meant to the Indian children Attempts to find out why these children are what they are and what can be done to help them take their place in our democracy

Science News Letter, February 2, 1946

ENGINEERING

Sea-Level Channel Urged for Panama Canal

➤ LOCKS AND DAMS of the present Panama canal are its parts vulnerable to enemy bombing, and the canal should now be a lock-less, dam-less sea-level cut across the Isthmus, John G Claybourn, Panama Canal engineer, reported to the American Society of Civil Engineers in New York This was recommended by a majority of the engineers on the commission which studied the project in 1905-06

Mr Claybourn is superintendent of the Panama Canal's dredging division and has been associated with the canal since 1910 The proposed sea-level canal, he said, would have no dams or locks other than readily-reparable underwater tidal locks The reconversion to the sea-level channel could be accomplished most economically by doing the work now, simultaneously with the resumption of the construction of the third set of locks authorized by Congress in 1939 and interrupted by the war.

Only half the channel would be excavated an additional 30 feet of depth at a time, he said, and when the work was completed, the channel would be 500 feet wide and of an average depth of 55 feet.

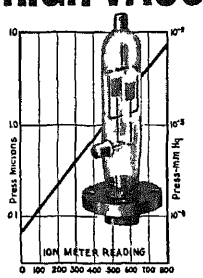
Mr Claybourn pointed to the Suez Canal as proof of the superiority of a sea-level route over the American lock and dam structure The Suez, he stated, passed the largest ships efficiently, at low cost, and with practically no hazard It was blocked by sunken vessels during the war but only for days Its effectiveness as a world-wide waterway has been demonstrated, Mr Claybourn said, with channels less than half the minimum recommended for Panama at sea level

"Authoritative statements have been made by high officials of the Government that the present lock canal cannot be protected against bombing," Mr Claybourn continued "These statements were made before the advent of the atomic bomb With this instrument of devastation, destruction of our control works would be infinitely greater, resulting in the disintegration of structures and even removing the possibility of making repairs, as might be possible with ordinary bombing"

Science News Letter, February 2, 1946

Sulfur dusts distributed from airplanes to control certain potato diseases are best applied early or late in the day, heat waves arise from the plants during the midday and prevent the dusts from settling on the foliage

HIGH VACUUM GAUGES



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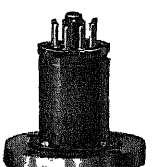
The Universal line includes two types of vacuum gauges of special interest to users of electron microscopes — the Universal highly sensitive cold cathode ionization gauge and the rugged Universal thermocouple gauge

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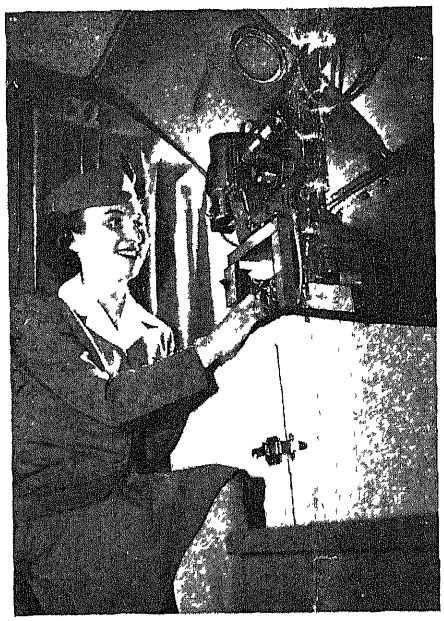
⚙ *ANTI-VIBRATION mounting unit, suitable for suspending radar and other delicate equipment in airplanes and in other places, effectively absorbs vibration in more than one direction A stainless steel spring of special design with three-way freedom of movement carries the principal load*

Science News Letter, February 2 1946

⚙ *TRICYCLE, recently patented, is operated either by foot or hand, or by both at the same time. One chain drive connects conventional foot pedals with a sprocket on the front wheel, and another connects hand grips, which replace the ordinary tricycle handlebar, with another sprocket on the same wheel*

Science News Letter, February 2, 1946

⚙ *MOTION PICTURES for airplane passengers are provided by a light modified 16-millimeter projector, special amplifiers, and standard speakers mounted in the cabin's ceiling. Projector is shock-mounted on a stand near the rear of the*



cabin, as shown in the picture. A vibrationless screen is at the front

Science News Letter, February 2, 1946

⚙ *WRENCH, recently patented, has a movable jaw that is automatically locked in place when merely pushed against the nut to be turned Thin plates within the base of the jaw make a firm pinching engagement with the shank of the wrench Thumb pressure on a tab projecting from one plate releases the grip*

Science News Letter, February 2, 1946

⚙ *TABLET BOX, with rounded corners, has a flat top pivoted at its center so that it can be turned. Semi-circular pieces are cut out of the middle of the two shorter edges of the cover, which, when properly positioned with the rounded box corners, form circular openings through which the tablets can be dispensed, one at a time*

Science News Letter, February 2, 1946

⚙ *STATIC ELIMINATOR, to remove static electricity developed by machines and other industrial processes, is a specially designed housing containing radioactive foil which emits alpha rays in a controlled direction. By ionizing the air, the rays make it an electrical conductor*

Science News Letter, February 2, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 296*

Question Box

AERODYNAMICS

Why is the German wind tunnel, now in the United States, of unusual interest? p 73.

AERONAUTICS

What plane has set a new endurance record? p. 72

BIOCHEMISTRY

What new source of vitamins is seen as a possibility? p. 72

CHEMISTRY

What is the new competitor of DDT? p. 71.

ELECTRONICS

How far did the radio waves travel which contacted the moon? p. 67

What is "blind navigation"? p. 66

When were the first radio impulses received from outer space? p 68

FISHERIES

What kind of an invasion threatens the eastern seaboard? p 73

GENERAL SCIENCE-EDUCATION

How many states have winners in the Fifth Annual Science Talent Search? p. 69

METEOROLOGY

How was data on position, course, etc of typhoons obtained during the war? p. 76

PHYSICS-BOTANY

What will be the effect of the atom bomb blasts on the fish in Bikini lagoon? p 78.

Where published sources are used they are cited

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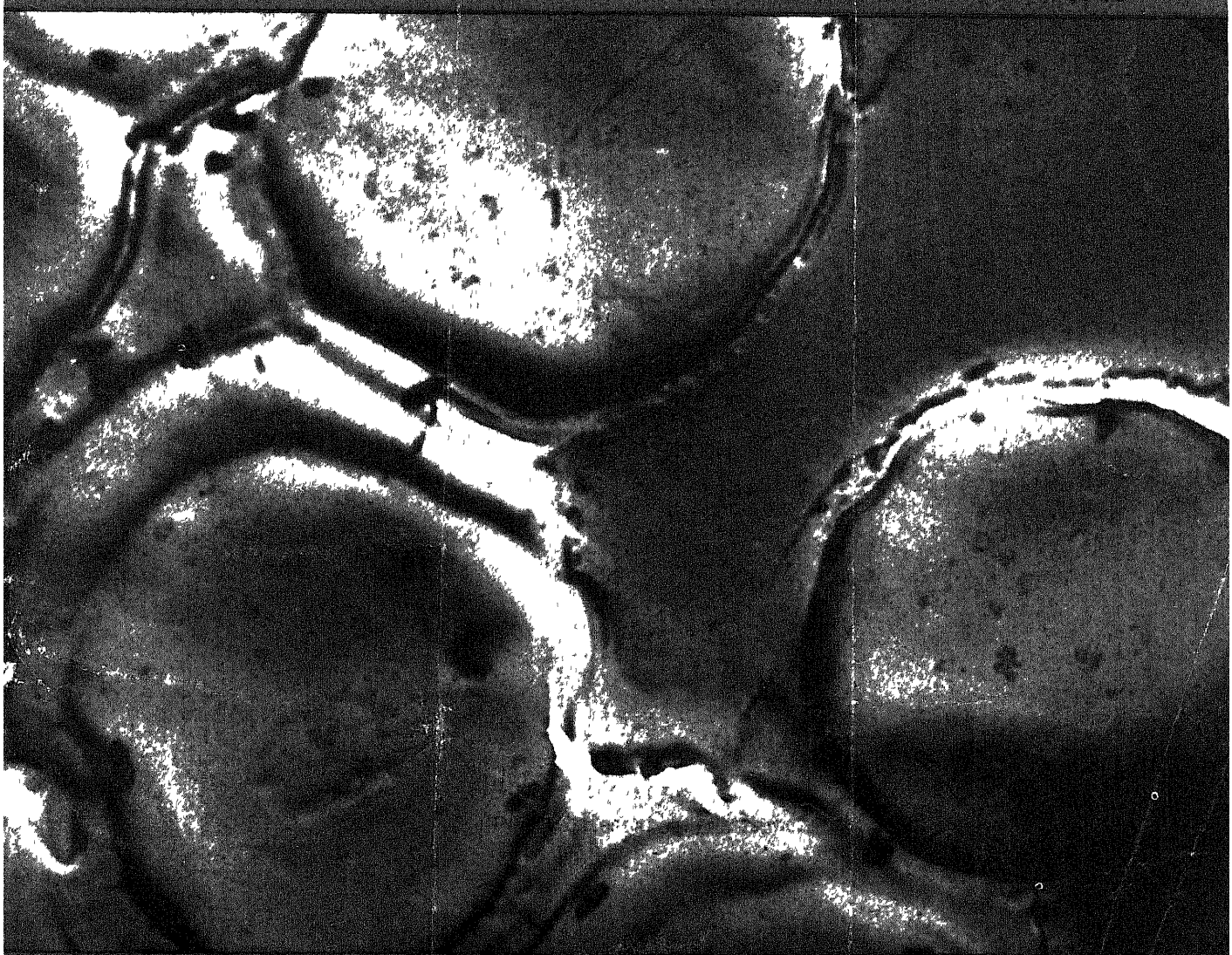
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 9, 1946



Blood-Cell "Footprints"

See Page 86

A SCIENCE SERVICE PUBLICATION

MEDICINE

St. Louis Virus Isolated

Sleeping sickness germ found in California for first time. Definite evidence that fowl are the main reservoir of the disease.

➤ WITH THE ISOLATION for the first time of the St Louis encephalitis virus in California and definite evidence that fowl are the main reservoir of the disease, scientists are fitting together the pieces of what may become a general pattern for this so-called sleeping sickness in the Western states

Scientists in the Hooper Foundation for Medical Research at the University of California Medical School isolated the St Louis type virus from a common type mosquito caught in Kern County. It had been generally conceded that the virus was present, but definite proof had been lacking previously

Hooper researchers Dr W. C Reeves and Dr W. McD Hammon have found the following sleeping sickness pattern

Fowl, both domestic and wild, are the principal reservoirs of the virus Mosquitoes, especially the common species, *Culex tarsalis,* feed on the fowl, then bite horses and man Preference for the fowl makes the barnyard an excellent reservoir, and biting of man and horses causes occasional sharp epidemics in Western states.

This pattern has repeated itself in two major studies of epidemics, one in the Yakima Valley, Wash , 1941-43, and the other in Kern County, Calif , which occurred in 1943 The latter study is still not completed

In both studies the investigators collected thousands of mosquitoes, ticks, fleas, lice, flies, kissing bugs and bedbugs Examination of the stomach contents of these specimens showed that only mosquitoes were infected with the virus and that they had fed on fowl

While the virus produces no disease in fowl, it does cause serious illness in both horses and man, affecting the nervous system and sometimes causing damage to the brain

Vaccination is effective, but is not recommended on a mass scale, because the incidence of the disease is so low

Horse encephalitis, of both the western and St Louis type, is confined in the West ordinarily to hot valleys, and it occurs in man mainly in rural areas and the suburbs of large cities where chickens are kept

Science News Letter, February 9, 1946

ASTRONOMY

New Giant Prominence

May have been discovered on one component of the double star Zeta Aurigae. May be nearly as large as the sun itself, Dr. Kopal states.

➤ A GIANT PROMINENCE, similar to the huge flame-like clouds of gas seen erupting from the surface of the sun, may have been discovered on one component of the double star Zeta Aurigae, according to a paper presented at the American Astronomical Society meeting in New York by Dr Zdenek Kopal, of Harvard College Observatory The huge cloud of gas is sufficiently dense to almost completely hide the light of a smaller bright companion star. It may be nearly as large as the sun itself

Three times in about eight years, the blue-white B member of this double star is eclipsed by its giant red companion Preceding and following the total phase, during which the B or helium star is invisible behind the large red K member, the B star undergoes a series of partial obscurations behind portions of the immense atmosphere around the K star This atmosphere, which is as thick as one-fifth the diameter of the larger star, is in several layers, and a regular sequence of changes occurs as the B star passes behind these layers successively.

In the eclipse of December 18, 1939, to January 28, 1940, however, the blue star was obscured by a huge cloud about one million kilometers wide, which Dr Kopal interprets as a huge stellar prominence The light-curve of changes during this eclipse was very peculiar, and the Harvard astronomer thinks it was just a matter of chance that the fainter star passed behind this particular "prominence" in its primary's atmosphere This rare event may not occur again for several cycles, so he suggests very careful observations of future eclipses of Zeta Aurigae to see how often this phenomenon repeats itself

Among these same lines, spectroscopic analysis of the weaker lines in the spectra of the star Arcturus and of the star 70 Ophiuchi A, made by Suzanne E A van Dijke, National Research Fellow at Mount Wilson Observatory, show the relative differences between these stars Arcturus is a giant orange star, while 70 Ophiuchi is a dwarf of the same type. Stratification of elements in the atmosphere of the giant star was found to be similar to the layer arrangement in the atmosphere of the sun Thus, the solar atmosphere appears to be a prototype of stellar atmospheric structure, although on a smaller scale than in giants like Arcturus and Zeta Aurigae

Nevertheless, work at the Leander McCormick Observatory of the University of Virginia, reported by Emma T. R. Williams and A N Vyssotsky, indicates that stars are not all of the same genesis These investigators have found that red giant stars appear to form a more spherical system of stars in the Milky Way galaxy than do normal white A-type stars.

"Red giants," said Dr. Vyssotsky, "seem to conform to a very different code of laws from those governing A-type stars. The red giants are mostly nearer the galactic center, but distributed farther from its plane, so they form a more spherical system than do the A stars, which hug the plane but spread out well beyond the sun's distance from the center."

This work on stars in our own galaxy gives results similar to those procured by Dr. Walter Baade, of Mount Wilson Observatory, for the exterior galaxy, M33, in Triangulum, one of the nearest of other stellar systems Dr Baade found that the red giants of M33 are highly concentrated towards the central spheroid, whereas the A-type and other white stars are characteristic of the arms. Dr. Vyssotsky pointed out this similarity to his own results

Science News Letter, February 9, 1946

PHYSICS

New Gas in Atmosphere

Sun photographs detect the presence of nitrous oxide close to the earth. May result from slow decomposition of fertilizers in farming areas.

➤ THE EXISTENCE of the gas, nitrous oxide, in the earth's atmosphere in sufficient quantity to record on spectrum photographs of the sun has been established by Dr Arthur Adel, of the Randall Laboratory of Physics, University of Michigan He reported his work before the meeting of the American Astronomical Society in New York

Dr Adel has discovered and analyzed an absorption band at wavelength 7 77 mu in the infra-red photographic spectrum of the sun This is a "telluric" band, which means that it is put into the spectrum by the selective absorption of sunlight as it passes through the earth's atmosphere Telluric lines, such as those of oxygen and carbon dioxide, are easily recognized in most cases because they do not show the Doppler shift shared by lines originating in the sun's atmosphere and partaking of the sun's rotation and other apparent motions

In recent examinations of soil air, M W Kriegel, of the Carter Oil Company, Tulsa, Okla, has found a gas which he believes to be nitrous oxide, and he suggests that this may result from the slow decomposition of commercial fertilizers in farming areas, since nitrogen is the common element in ammonium salts, nitrites, nitrates, and other fertilizers Decomposing vegetable matter under aerobic conditions also gives off a gas having the properties of nitrous oxide. Dr Adel suggests that soil air is thus probably the chief source of the "layer" of atmospheric nitrous oxide

Better Infra-Red Photos

➤ THE NITROUS oxide band at 7 7 mu is far out in the infra-red region of the spectrum—at 77,000 Angstroms Observations of the spectra of the stars have not extended out nearly this far, but Dr W. F Swann, of Eastman Kodak Company, Rochester, N Y, reported to the astronomical meeting that astronomical spectroscopic plates had received much improvement during the war, and that within the past year Mount Wilson Observatory has succeeded in obtaining spectra beyond 11,000 Angstroms of some of the brighter stars.

Dr Swann reported an increase in the sensitivity of Type IZ, an infra-red emulsion, of five times, he also noted that Type 649-GH spectroscopic plate is capable of resolving more than 1,000 lines per millimeter, making it very useful for making reticles and graticules The industrial applications of this film are widespread

Lost Sun-Star

➤ THE DISCOVERY of a "dark" companion star to the brightest star in the constellation of Ophiuchus, was reported by Dr Nicholas E Wagman, acting director of Allegheny Observatory, University of Pittsburgh Preliminary estimates indicate that the companion of Alpha Ophiuchi is a star similar to the sun, but because the brighter star outshines it 20 times, its light is lost in the glare This companion appears to be moving about the bright primary star at a distance seven times that of the earth from the sun, in a period of about 8½ years The presence of the faint companion is determined by its effect on the motion of the bright star, which appears to pursue a wavy path across the sky

Science News Letter, February 9, 1946

ARCHAEOLOGY

Easter Island Relics Only a Few Centuries Old

➤ THE GREAT, gaunt stone faces that stare sightlessly over the ocean from the slopes of lonely Easter island in the South Pacific are not the last relics of a great civilization, drowned by a continental catastrophe thousands of years ago, declares Dr Alfred Métraux, Smithsonian Institution anthropologist Although their origin remains veiled in mystery, the best evidence he has been able to muster indicates that they are almost certainly less than 800 years old, possibly not more than 500 or 600.

Dr. Métraux points out that although the huge images are made of soft stone and stand where heavy rains beat and



NOT SO OLD—This Easter Island man in the Hall of Fame at the American Museum of Natural History is almost certainly less than 800 years old.

the ceaseless wind works on them night and day, they are relatively little weathered Their outlines are still sharp and hammer marks are plainly visible. If they were as old as romantic accounts would have them, they would be much more severely weathered.

Dr Métraux has also attempted to solve the riddle of the figure-inscribed pieces of wood found on the island. He is convinced that the inscriptions are not true writing, and that they have no relation to 5,000-year-old stone tablets covered with hieroglyphics that have been found in India, and which they are said to resemble After testing and discarding several hypotheses, he regards as most probable the idea that these inscribed slabs represent a special type of "orator staff," a badge of office used by tribal story-tellers elsewhere in Polynesia

Easter island itself is not a last surviving mountain-peak of a sunken continent, Dr. Métraux is convinced. Soundings show that it is the emerged top of an isolated submarine volcano, standing alone on a monotonously level ocean floor. The Polynesian ancestors of the present inhabitants came there in canoes, probably about the twelfth or thirteenth century A.D.

Science News Letter, February 9, 1946

Chinook *salmon* spawn, usually, only in water below 54 degrees Fahrenheit.

ASTRONOMY

Only 11 Billion Galaxies

New 200-inch telescope, when completed, expected to furnish data for test of new theory of relativity which reduces population of the universe.

➤ THE 200-INCH telescope is expected to furnish observing data for a critical test of a new theory of relativity which cuts down the population of the universe to only about 11 billion galaxies. This theory, proposed by the late Dr. George D Birkhoff, of Harvard University, has been applied to the dynamics of the universe by Sr Luis Enrique Erro, director, and Dr Carlos Graef, assistant director, of the Mexican Astrophysical Observatory at Tonanzintla, in the State of Puebla, Mexico

In three papers given at the meeting of the American Astronomical Society in New York, they present the results of their computations and point out that counts of remote star systems, so faint as to be seen only by the Mount Palomar telescope, are needed to give observational proof of the correctness of the Birkhoff theory

The new theory predicts, according to Sr Erro and Dr Graef, a uniformly expanding universe, which began this expansion about 2,000 million years ago, in agreement with the "short time-scale" of the universe The analysis satisfactorily accounts for observations of the red shifts in the spectra of galaxies and for their distribution in space as determined with the 100-inch telescope at Mount Wilson and by researches at Harvard College Observatory The limit of the 100-inch instrument is the 21st magnitude (photographic), whereas Sr. Erro has been able to predict the distribution of galaxies as faint as magnitude 23.5, the probable limit of the 200-inch telescope It is for these very remote galaxies, whose light spends up to 1,000 million years reaching us, that the predicted counts on the basis of the Birkhoff theory differ notably from the predictions of other theories, notably those developed by Dr. Edwin P. Hubble, of Mount Wilson Observatory.

Dr. Hubble's studies have led to two rather puzzling dilemmas. If the assumption is made that the universe is in expansion in the sense predicted by Einstein-Lemaître relativity, the red shifts seem to vary as if the universe were slowing its rate of expansion. Its age then seems to be only about 1,000 million years, only half the short time-scale and probably only half the age of the earth The Birkhoff theory predicts uniform expansion and twice the age.

The second Hubble dilemma concerns the numbers of galaxies actually observed, and indicates a very small, crowded universe with positive space curvature. Birkhoff's theory leads to a less crowded universe, with a set of corrections to be applied to the magnitudes of the most distant galaxies different from those required by Einstein-Lemaitre theory

"The all-important point in Birkhoff's theory is his central postulate of four-dimensional flat space as the geometric frame of cosmic events," Sr Erro said "To my way of thinking, it is a return to Newtonian dynamics, although the Birkhoff theory retains all the assumptions of special relativity proposed by Einstein in 1905 Einstein's general theory is an attempt to substitute geometry for dynamics Instead of gravitational 'forces' acting upon mass points, the concept of space curvature is introduced Birkhoff returns to the concept of 'force' and to the implicit Newtonian postulate of flat space."

Science News Letter, February 9, 1946

BIOCHEMISTRY

Rutin To Go Into Full Scale Production This Year

➤ RUTIN, a drug effective in reducing the increased fragility of small blood vessels which may lead to blinding or fatal hemorrhages in cases of high blood pressure, will go into full scale commercial production this year, the U. S Department of Agriculture has announced

Discovery by the department's scientists that the green buckwheat plant is an economical source of the drug, following a two-year search for such a plant, makes possible the commercial manufacture of rutin which is described as a bright yellow, non-toxic powder

The marked similarity of rutin's chemical structure to that of vitamin P, known for its effect on the fragility of small blood vessels, intrigued the interest of Dr James F Couch of the Department's Eastern Regional Research Laboratory. Following his suggestion, medical studies of rutin were made by Dr J Q. Griffith, Jr, of the University of Pennsylvania.

Results of his studies and those of about 100 other physicians gave further evidence, the department states, "of the value of rutin for reducing increased capillary fragility and showed that thiocyanates and other drugs for reducing high blood pressure can be used safely after treating with rutin."

Science News Letter, February 9, 1946

Approximately one-fourth of the *deaf* have deaf relatives.

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ASTRONOMY

Astronomy Meetings

Executive Committee of the International Astronomical Union will convene at Copenhagen in March. Soviet and U. S. each to send three delegates.

➤ THE EXECUTIVE Committee of the International Astronomical Union, which had suspended activities for the duration of the war, will convene at Copenhagen on March 7 The three American delegates will be Dr Otto Struve, director of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas; Dr Joel Stebbins, director of the Washburn Observatory of the University of Wisconsin and research associate of the Mount Wilson Observatory, and Dr Harlow Shapley, director of the Harvard Observatory and president of the American Section of the International Astronomical Union

Soviet astronomers look forward with great interest to the opening of the conference as the first practical measure for the restoration of international cooperation in science, according to a cablegram to *Science Service* from Prof Gregory Neuimin, director of the famous Pulkovo Observatory near Leningrad The Soviet Union will be represented by three delegates, Prof. Neuimin reports He adds that Soviet astronomers are drawing up a number of proposals on the organization of scientific work and the participation of the Soviet Observatory in international undertakings

The Conference in Copenhagen, Prof Neuimin continues, will be attended by 20 astronomers from the ten most important countries in astronomical research Some of the proposals that will be presented by the Soviet astronomers are the organization of an international center in Russia for the study of variable stars, and the participation of Russia in the renewed work of the Bureau, formerly centered in Germany, for the study of minor planets At the Conference the Soviet delegates will report on the joint work of Soviet observatories in a compilation of a catalogue of faint stars, Prof. Neuimin states. They will also propose to foreign observatories that they participate in this work on faint stars, and they will submit also a number of other proposals on the organization of the international time service, the publication of astronomical annuals, etc.

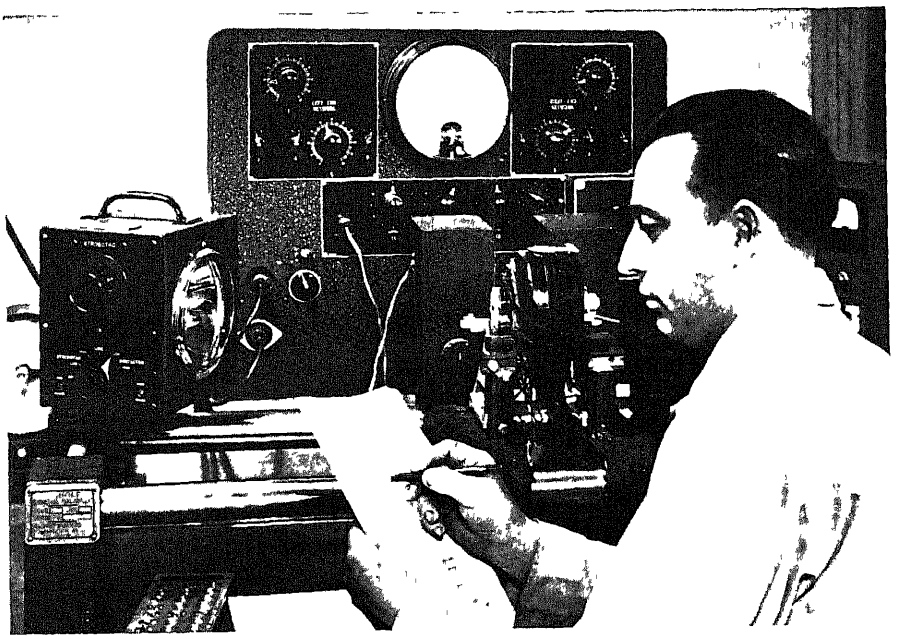
The Pulkovo Observatory, of which Prof. Neuimin is director, was completely destroyed by German bombardments and bombs during the siege of Leningrad Some of the library and a few of the astronomical lenses were taken from Observatory Hill and buried Some of the other Russian observatories were also destroyed or badly damaged and it is now the plan of the Soviet government to restore all of the astronomical equipment and improve its quality and increase its quantity

The plans for renewal of international work in astronomy were formulated on Pulkova Hill in June, 1945, when Dr Harold Spencer Jones, Astronomer Royal of England, and Dr. Harlow Shapley were in Russia as guests of the Soviet Academy of Sciences.

The scope of research work now confronting astronomers, Prof Neuimin stated in the cablegram, insistently demands cooperation and coordination of the comparatively few scientific institutions and individual scientists working in this field Need for an international organization of astronomers as early as the 18th century led to the formation of a more or less stable international union to carry out tasks that are beyond the power of one observatory or even of all observatories of one country.

This tendency found more complete expression after the first World War when the International Astronomical Union was formed A number of countries represented by their academies of sciences or by scientific committees entered the Union The purpose of the Union is to coordinate and organize astronomical work in all its branches Every three years the Union convenes a congress where past work is summed up and future tasks outlined

The USSR joined the International Astronomical Union in 1935 and was represented at the following and last congress held in Stockholm in 1938. Germany didn't deem it necessary to join the union.



FOR BALANCING—Stroboscopic light played an important part in the exact balancing of rotating parts in the Norden Bombsight where tolerances were kept within 20 millionths of an inch. Timed light flashes permitted precise determination of rotating speeds and visual study of imbalance during laboratory tests. In the picture is a technician in the laboratory of the Victor Adding Machine Company using a General Radio Strobotac and a Gisholt Dynetric Balancer.

The work of the International Astronomical Union was brought to a standstill by the war Observations were continued as far as possible at observatories that escaped destruction, but contact even between scientists of Allied countries was at best sporadic

Science News Letter, February 9, 1946

CHEMISTRY

Concrete from Coral

Method using water from the ocean has promising uses for construction on coral islands without other rock or fresh water.

➤ GOOD QUALITY concrete was successfully made during the war with coral and sea water, it is now reported This was done on Bermuda, where fresh water for the purpose was not available and where there is none of the ordinary rock usually employed in concrete making. A chemical compound added to the cement-coral mixture reduced water requirements and helped control the mix while setting.

The discovery of the method of making concrete satisfactory for construction purposes from coral and sea water is important now because the United States may find it necessary to build naval and other facilities on other coral islands without ordinary rock It will mean a great saving in transportation costs if local coral is used instead of crushed rock shipped many miles from continental sources of supply.

Coral, rich in calcium, is the skeleton structure created by tiny marine animals known as polyps It is filled with tiny holes and is highly water-absorbent as well as light in weight Aggregates made with it would have moisture-retaining properties which might cause dangerous rusting in steel reinforcing rods

The story of the use of concrete from coral and sea water in Bermuda is told in *Industrial and Engineering Chemistry,* an official publication of the American Chemical Society. Bermuda has plenty of coral but none of the ordinary American varieties of rock It has no fresh water except the rainwater caught on roofs and run into reservoirs. In spite of the lack of rock and fresh water, concrete was a military necessity for bases for the armed forces on this island.

The decision was made to experiment with local materials. The National Bureau of Standards and the cement industry had conducted research on the use of sea water for mixing concrete. It had been found that sodium and other chlorides would not induce corrosion. Sulfides might, but these were present only in very small quantities

Cement and water provide the mortar or binder which fills the spaces when stone and sand are mixed in concrete making The engineers in Bermuda obtained a considerable reduction in the water-cement ratio by using a pozzolanic (volcanic ash) compound in the mixture Chemically the compound used was calcium lignosulfonate Its use reduced water requirements by about 17%, and resulted in a concrete that tested over 4,000 pounds per square inch in strength.

Science News Letter, February 9, 1946

PHYSICS

Thermometers Measure Speed of Jet Planes

➤ THE USE of thermometers to measure speeds of supersonic jet planes and other high-speed aircraft has been announced by the Navy Department At the same time an instrument to measure the speed of helicopters and other slow-moving aircraft was revealed

The thermometer method was discovered by Dr Theodore Shedlovsky, at the Rockefeller Institute, in connection with work in developing a way to measure true outside temperature during flight Outside temperature strongly affects the readings of all the major aircraft instruments.

Dr Shedlovsky mounted two thermometer "probes" in the air stream, one shielded and the other exposed to the full air flow, determining true temperature electrically by the difference in readings between the two probes

Then he discovered that the difference in rise shown by the two probes is proportional to the square of the speed of the plane

The slow-speed instrument was developed at the National Bureau of Standards. Its key is a set of light-weight anemometer cups mounted on practically frictionless bearings which start rotating in less than two knots of wind and give extremely accurate readings

Science News Letter, February 9, 1946

PHYSIOLOGY-MICROSCOPY

Plastic Impressions Show How Blood Cells Look

See Front Cover

➤ RED BLOOD CELLS, human hair, fibers and a host of other things in the submicroscopic world can now have their "footprints" caught for study by a new film-plastic technique in combination with the electron microscope The photograph on the front cover of this SCIENCE NEWS LETTER shows what red blood cells look like when magnified 13,000 diameters

Scientists were baffled for a time in trying to make greatly magnified photographs of nylon fibers, sulfadiazine crystals and bacteria because they were too thick to be penetrated by either light waves or electrons But now, just as FBI experts use moulage to preserve and study footprints of criminals, so the impressions of these submicroscopic objects can also be examined

Little pressure is used in getting a plastic cast of these delicate materials that might easily be crushed beyond all recognition The markings left by the specimen on the thermoplastic film are permanently recorded by depositing a thin film of silica upon it It is the silica film that is actually photographed by the electron microscope

The new technique was first used in studying the surfaces of fibers. The scales and fine markings found in replicas of wool fibers are those characteristic of all fur fibers Replicas of nylon fibers show long grooves made by imperfections in the spinnerette through which the hot nylon plastic was forced in making the fiber

How the replicas are made with simple equipment is told in a technical paper in the *Journal of Applied Physics* by Dr. R Bowling Barnes, Charles J Burton and Robert G. Scott of Stamford Research Laboratories, American Cyanamid Company

Science News Letter, February 9, 1946

New *germicide materials,* known as quaternary ammonium compounds, destroy bacterial life within five minutes after exposure of the organisms to concentrations as low as one part in 20,000 parts of water.

ENGINEERING

Self-Guided Loran

May in the future guide ships and planes without human assistance on fixed courses. May also be developed to guide V-bombs.

➤ SHIPS AND PLANES of the future may be guided by Loran without human assistance and with no possibility of deviating from a fixed course, declared J A Pierce of Harvard University at the recent meeting of the Institute of Radio Engineers in New York City He painted, also, an awe-inspiring picture of how Loran may be developed to guide pilotless aircraft and bombs in future warfare

Loran is a wartime development of American scientists used with great success to guide military planes and ships straight to their targets and back again over vast expanses of land or water It is similar to radar in its techniques, but differs in having the transmitters at fixed points on the ground along coast lines or on islands, and only receivers in the planes or ships

The basic operation Loran performs is the determination of "lines of position," Mr Pierce explained This is done by measuring the relative time of arrival of two different pairs of radio pulses, which are known to have emanated from four fixed transmitters at times differing by a known interval, he said The time difference of arrival is measured by the Loran receiver to a millionth of a second

From this information, Mr Pierce continued, the navigator can draw two curves which represent the lines of position The point where these lines cross is the exact position of the plane or ship The entire operation requires but a few minutes and is a big improvement over the age-old method of "shooting the stars" with a sextant, he asserted.

Mr Pierce was head of the Loran division at Radiation Laboratory on the campus of the Massachusetts Institute of Technology during the war He is now a fellow at Harvard's Cruft Laboratory, continuing research work on radio propagation

Standard Loran now in use operates at several frequencies between 1700 and 2000 kilocycles, he stated, and radiates pulses twice as powerful as the largest United States broadcasting stations In the daytime the device has a range of about 800 miles over water, but at night, by utilizing waves reflected from the upper portion of the earth's atmosphere, the range is about 1,600 miles

The average error in using Loran is very small, he said, but a new technique still in the laboratory shows promise of radical reduction of even the present errors

The development of receivers which will perform all functions automatically will be relatively simple, Mr Pierce declared, and also of equipment that will trace on a chart a permanent record of the ship's movement It is then but a short step, he added, to make "connection between the map and the rudder of a vessel so that a predetermined track may automatically be followed"

Science News Letter, February 9, 1946

ELECTRONICS

Power Lines Used For Telephone Service

➤ TELEPHONE service over rural electric lines bringing light and power to farm homes is under test in the area around Jonesboro, Ark , it is announced In the new system, speech is transmitted by means of a carrier wave of radio frequency which travels on the power lines along with the power supply

Electronic transmitting and receiving equipment is installed at the central switchboard and at each subscriber's end of the line The dial instrument is used as in regular telephone service Technical steps have been taken to prevent mutual interference between the two currents flowing on the same line The power current has low frequency and high voltage, the telephone carrier current has high frequency and low voltage

Steps have been taken, also, to eliminate reflections from branch lines, and to assure safety of users and maintenance men. The tests are encouraging, but the engineers in charge of the project point out that the new system is just emerging from the laboratory and that further experimentation is necessary before commercial application can be made.

This test installation is on power lines of the Rural Electrification Administration, with equipment in daily use by four telephone subscribers of the REA-financed Craighead Electric Cooperative Corporation When the system is perfected it can be used to bring telephones to many of the nation's 2,750,000 farm families now served by power lines, but for many of which regular telephone lines are not available

Science News Letter, February 9, 1946



OUR ANSWER—This non-metallic mine-detector located enemy mines made of clay, wood, glass and plastics. It consists essentially of an ultra-high-frequency radio wave transmitter and picks up both metallic and non-metallic mines at depths ranging from three to 12 inches. Official U. S. Army photograph.

ENGINEERING

Combination Gas and Oil Burner for Furnaces

➤ A BURNER for furnaces, in which either gas or oil can be used, and the switch from one to the other be made instantaneously, is offered by William A. Clements of Glendale, Calif, for patent 2,393,887 The same pipe and nozzle that blow in the gas inject a blast of high-pressure air when one valve-handle is turned Opening another valve admits the oil The air blast atomizes this into spray, which burns in a long, hot flame.

Science News Letter, February 9, 1946

Nearly 6,000,000 pounds of *sunflower seed* were grown in the United States in 1945 to produce table oils and animal feed.

DIRECTIONS Read each Section carefully The questions following each Section are based on the information given In other words, the answers to the questions are dependent in some way on the materials of the Section to which they belong Four possible answers are given for each question Put an X in the answer box corresponding to the answer which you think is most nearly correct.

SECTION A· Special study of the heart rate of small birds and mammals has been made by means of the cardio-vibrometer Because the heart rate is variable and such a sensitive "physiology-of-the-whole" indicator, it is necessary (1) to determine a basal rate or some sort of standard rate to serve as a basis for comparisons, and (2) to obtain quantitative data, that is, a large number of readings over sufficient time period to obtain a true measure of heart activity To obtain a basal rate, muscular activity, food intake, temperature and cerebral activity (fear, excitement, etc) must be controlled since, generally speaking, these have the most marked effects on the heart rate Removal of the unpredictable effects of the conscious centers has been one of the chief difficulties in dealing with the heart rate in the past, but with the cardio-vibrometer this factor can be satisfactorily controlled even in wild species since the heart beat together with breathing and other movements is picked up indirectly, amplified, and recorded by a piezo-electric system No electrodes are attached to the bird, it perches normally of its own volition, and need not be disturbed in any way during the experimental period The use of a crystal-driven pen recorder facilitates obtaining a large number of accurate readings over long periods

Disregarding age, sex, and seasonal variations, the average basal heart rates in round numbers of several species of birds are listed in the table, together with the maximum rates which were recorded immediately after flying, vigorous exercise, or excitement The basal rates represent the average rates of the birds when at rest, in a post-absorptive but not starved condition (3-7 hours after last feeding for passerines, longer for larger birds or those with crops), in darkness, away from human presence, and at an air temperature at or slightly below thermal neutrality (about 30-32°C for small birds)

AVERAGE BASAL HEART RATE (TIMES PER MINUTE) IN ROUND NUMBERS AND MAXIMUM HEART RATE

	Number of Individuals	Approx wt (gms)	Basal rate	Maximum rate
Mourning Dove (Zenaidura macroura)	5	130	135	570
Towhee (Pipilo erythrophthalmus)	4	40	445	810
Cardinal (Richmondena cardinalis)	3	40	375	800
English Sparrow (Passer domesticus	7	28	350	902
Song Sparrow (Melospiza melodia)	5	20	450	1,020
Canary (Serinus canarius)	10	16	514	1,000+?
Black capped Chickadee (Penthestes atricapillus)	14	12	480	1,000
Chipping Sparrow (Spizella passerina)	2	12	440	1,060
House Wren (Troglodytes aedon)	4	11	450	950
Ruby-Throated Hummingbird (Archilochus colubris)	2	4	615	?

QUESTIONS FOR SECTION A

51 Although the relationship is far from perfect, which is the most nearly correct statement regarding heart rate in small birds?
- () 1 the size of species and heart rate are independent
- () 2 the smaller the species, the less rapid the rate
- () 3 the smaller the species, the more rapid the rate
- () 4 the smallest species has the fastest maximum rate

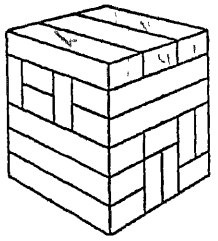
52 The word "passerines" refers to birds
- () 1 at rest
- () 2 like the sparrow
- () 3 that migrate
- () 4 without crops

PART B

53 A piezo-electric system has been used to
- () 1 eliminate recordings of breathing
- () 2 piece electrical discharges together
- () 3 remove effects of conscious centers
- () 4 vary an electric current by means of pressures

54 The heart rate of birds
- () 1 is a maximum after flying or excitement
- () 2 is a minimum at 30° to 32°C
- () 3 is doubled under conditions of exercise
- () 4 must be measured in times per minute.

SECTION B. The 6-inch cube shown in the diagram is made up of pieces each 1 inch thick, 2 inches wide, and 6 inches long Each block is painted in three colors, red, blue, and yellow according to its position as shown in the diagram The top side of each block is red The bottom side of each piece is blue, and the vertical sides are yellow



QUESTIONS FOR SECTION B

55 How many 1 x 2 x 6 blocks are there in the 6-inch cube?
- () 1 15
- () 2 18
- () 3 27
- () 4 36

56 How many square inches of block are painted blue?
- () 1 150
- () 2 180
- () 3 210
- () 4 256

57 What is the largest number of plane surfaces of other blocks touched by the plane surfaces of any one block?
- () 1 8
- () 2. 11
- () 3 13
- () 4 15

58. How many square inches of blue surface are touching red surfaces?
- () 1. 94
- () 2. 108
- () 3 144
- () 4 196

59. Which arrangement of the blocks, forming a 6-inch cube, painted in the fashion described in the paragraph, would require the smallest possible area of yellow paint?
- () 1 all blocks laid with a 2 x 6 side horizontal
- () 2 all blocks laid with a 1 x 6 side horizontal
- () 3 all blocks laid with a 1 x 2 end horizontal
- () 4 the arrangement makes no difference

PART C

101 At 9.30 a.m. every morning a group of 100 factory workers (50 men and 50 women) stop work for 10 minutes and each drinks one cup (8 ounces) of hot coffee (44°C) Between 10 00 and 10 30 their rate of output increases. What conclusion can you draw from this? *(Answer in less than 10 words)*

102. A mariner is attempting to forecast the weather. He has available for ready reference accurate records of past fluctuations of wind, temperature, and humidity, and changes in cloud forms. He also knows what changes in weather accompanied them. He can predict the weather more accurately if he also has records available of past fluctuations of what? *(Answer in less than 10 words)*

103. If each of N light waves (that is, all of the component simple waves making up a group of light waves) travels with the same velocity V, with what velocity will the N travel? *(Answer in less than 10 words.)*

104 A variety of different things are listed below in Column I A variety of other things are listed in Column II, which are found in or derived from those in Column I For each item in Column I, put the number of the appropriate item in Column II which is found in or derived from it

Column I	Column II
() Adrenal glands	1 Acetylene
() Blood	2 Agglutinin
() Calcium carbide	3. Cortin
() Collagens (in vertebrate animals)	4. Ganglion
() Grain	5 Gelatin
() Mould	6. Helium
() Nerve tissue, nerve cells	7 Lignin
() Poppy	8 Opium
() Shale, coal, petroleum	9 Paraffin
() Uranium minerals	10. Penicillin
) Wood	11 Riboflavin

PART A

DIRECTIONS Four possible answers are given for each question Put an *X* in the answer box corresponding to the number of that answer which you think is most nearly correct.

1 What is the name of a plane figure formed by four equal straight lines bounding two obtuse and two acute angles?

() 1 diamond
() 2 pentagon
() 3 square
() 4 trapezoid

2 Which of the following series does *not* contain the name of an achromatic color?

() 1 black, red, blue, yellow
() 2 orange, white, blue, green
() 3 red, yellow, brown, gray
() 4 red, blue, green, yellow

3 Which one of the following metals is always in an amalgam?

() 1 gold
() 2 tin
() 3 lead
() 4 mercury

4 Which of the following is a chemical change?

() 1 magnetizing a rod of iron which weighs one kilogram
() 2 burning one pound of coal to determine its heat capacity
() 3 mixing flake graphite with oil
() 4 vaporizing one gram of mercury in a vacuum

5 How many half-inch squares would make an inch square?

() 1 2
() 2 4
() 3 8
() 4 16

9 A sphygmomanometer is a device used in the measurement of

() 1 auditory acuity
() 2 blood pressure
() 3 muscle tension
() 4 neural conductivity

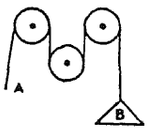
10 A prefix meaning hardness is

() 1 hypo
() 2 macro
() 3 sclero
() 4 seismo

11. A decigram equals 1 5432 grains How many grains are there in ten grams?

() 1 15432
() 2 1 5432
() 3 15 432
() 4 154 32

12 Through what minimum distance will rope A have to be pulled to raise weight B a distance of 1 meter? All pullies shown are in fixed positions



() 1 ½ meter
() 2 ½ meter
() 3 1 meter
() 4 2 meters

13 A solid all of whose plane surfaces are regular hexagons

() 1 does not exist
() 2 has 6 plane hexagonal facets
() 3 has 8 plane hexagonal facets
() 4 has 12 plane hexagonal facets

36 "A pigment cell, especially one capable of changes of form or concentration of pigment causing changes of color in the skin" is called

() 1 chromatin
() 2 chromatophore
() 3 chromogen
() 4 chromoplast

37 How many half-inch cubes completely fill a hollow cube the inside of which measures an inch in length, width and height?

() 1 4
() 2 8
() 3 16
() 4 32

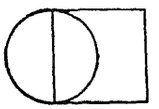
38 Which of the following may be said to be *poikilothermic*?

() 1 alligator
() 2. armadillo
() 3 salamander
() 4 ostrich

39 One old theory of combustion was that it is a process in which substances give off phlogiston The proof was as follows Some substances are seen to burn Other substances will not burn When a substance burns flames ascend, often with considerable force Something seems to be escaping in the flame This is named phlogiston Substances which contain phlogiston will burn, and substances which do not contain phlogiston will not burn at all The existence of phlogiston is further confirmed by the fact that the visible residuum of ashes, left after a substance is burned, is generally less, in both weight and bulk, than the substance was before it was burned This theory fails to take into account the

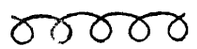
() 1 atomic weight of phlogiston
() 2 gaseous products of combustion
() 3 heat of the burning
() 4 weight and bulk of ashes

41 A circle of diameter d overlaps a square as shown in the diagram If the area of a circle is π times the square of half the diameter, what is the area of the part of the square not in the circle?



() 1 $d^2 - \frac{\pi d^2}{2}$
() 2 $4d - 2\pi d^2$
() 3 $d^2\left(1 - \frac{\pi}{8}\right)$
() 4 $\pi d^2 - 4d$

42 Which figure best typifies the path traced by a point on the circumference of a wheel, the wheel rolling in a plane along a line in the plane?

() 1 
() 2 
() 3 
() 4

43 *Paramorphism* is a term most likely to be used by which of the following?

() 1 a geologist
() 2 a mathematician
() 3 a serologist
() 4 a zoologist

TALENT TEST—These are sample questions from the Science Aptitude Examination, taken by 16,000 high school seniors. Only 3,000 were able to complete all the requirements, including this examination and an essay on "My Scientific Project." The 40 top winners have been invited to Washington March 1 to 5 to attend the Science Talent Institute and compete for the Westinghouse Science Scholarships, totaling $11,000.

GENERAL SCIENCE

Test Your Science Ability With These Questions

➤ HERE'S A SCIENCE aptitude test Spend about 40 minutes taking it. You will then have some inkling of whether your own particular abilities include reasoning of the sort that scientists have to use You won't necessarily be able to go out and solve problems in atomic energy, disease control, technology and other fields of physical and biological science so important today But you will have some new insight into what it takes to be a scientist.

The questions on these pages are reproduced from the aptitude test of the Fifth Annual Science Talent Search Thousands of boys and girls in their senior year in the nation's secondary schools took the full test as part of their entry in the search Three hundred have been selected for honors and 40 are being invited to the Science Talent Institute at Washington, March 1-5, to compete for $11,000 in Westinghouse Science Scholarships

Try these test questions on yourself or some friend. This is the way to do it There are three kinds of questions.

Answer all questions in Part A by putting an X in the answer box corresponding to the number of the answer which is most nearly correct In the case of Part B, first read each paragraph and then answer in a similar way each of the questions based on the information given In Part C answer as directed

Finish all the questions in one sitting and do not look at the answers printed elsewhere in the magazine until you are through.

The Science Aptitude Examination was made difficult purposely to eliminate those students who do not have the perseverance to finish a job, a prime requisite for a research scientist Since no senior is required to take the test, any of these 14-to-18-year-olds were privileged to get up and leave after one look —and many did

The test is only one of the techniques used in selecting boys and girls who are scientifically gifted. In addition each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out a recommendation form and principals reported scholarship. All these are used in choosing winners.

Of the thousands of boys and girls who have taken the examination, not one made a perfect score. (*Turn to page 92*)

PSYCHIATRY

Prescription for Peace

Globalunacy can be avoided by curing national insanity. Only way of dealing with aggressive nations is through collaboration and agreements.

By MARJORIE VAN DE WATER

➤ THE MENTAL PATIENT who poses as Napoleon or God suffers from "delusions of grandeur" and we have no doubt that he is "crazy."

Nations suffer from the same sort of insanity Germany under Hitler was one, Japan was another For a good many years the governments claiming supreme sovereignty, or the king or emperor who claimed to be all powerful, have gotten away with it But the world—and the scientists—are getting wise to such mental disorders of nations

The mental patient with "delusions of grandeur" lands in a mental hospital—unless, like Hitler, he could succeed for a time in putting the idea over on his public

In the nation, such delusions of power land a country in war

Many other parallels between the behavior of nations and the warped attitudes and thinking that produce mental breakdown in the individual are found by Dr. Kenneth E Appel, psychiatrist of the School of Medicine of the University of Pennsylvania

Nobody loves a hermit or a dictator, they are nearly always considered a bit queer To keep his mental health, a man must be able to get along reasonably well with other men at home, in business, in his social life He has to be willing to sacrifice some of his own personal interests for the sake of keeping his friends

It is much the same with nations They, too, must give up a certain amount of "supreme sovereignty" to preserve peace in the world

Important Problem

This is one of the most important problems facing the United Nations Assembly today—perhaps it is the most important

In reality, every nation, no matter how powerful, is dependent upon other nations Even in war, it is necessary to have allies. A reasonable cooperation with other countries in an international organization is necessary for the protection of mutual interests and the control of aggression in power-crazy nations

Isolationism for the individual, Dr Appel says, is a sort of mental suicide For the nation it is "globalunacy" Dr Appel, as a psychiatrist, has made a clinical study of this international insanity and has written a prescription

The cause of a nervous breakdown, or neurosis, simply stated, is the feeling of helpless anger and futility that comes from trying vainly to apply the fixed habits and attitudes of childhood to the new situations of adult life The child may overlearn his lesson when his mother teaches him that he must always be gentle, submissive and dependent on his parents' commands in the home If the child does overlearn, he may find himself tragically unfit to face an adult world of business or war If he cannot change to meet the new demands upon him, he will break.

New Ways of Thinking

Nations, too, Dr Appel points out, face the necessity of developing new ways of thinking and dealing with other nations to fit the new conditions of a world containing the modern inventions of radio, the airplane, rocket, and the atomic bomb If they fail to do this, the whole world faces catastrophe

People are naturally conservative, he says, they feel more secure in following the "safe" old ways And politicians and statesmen too often play upon this natural fear of the new and suspicion of the strange and foreign The result is short-sighted isolationism and dangerous nationalism

"New concepts, methods, and solutions must be developed to meet the new environment which modern technology has created for us," Dr Appel declares in the *Journal of Abnormal and Social Psychology* "Old methods will not solve new conditions They lead to disaster with the individual, and with nations they lead to war

"Modern technology has made us citizens of the world Men at the opposite side of the earth are our neighbors. The airplane and the radio have made the traditional concepts of geographical borders antiquated Borders and boundary lines should become administrative and cultural, not power concepts"

Isolationism in patients is always considered by physicians as an unhealthy sign No one can keep his mental health if he hides from other people and lives within himself To keep mental balance you need to be with other people, to share your experiences with them, to learn from them and laugh or weep with them The person who lives completely alone is likely to lose his grip on reality He may begin to see or hear things that are not there, to develop unreasonable suspiciousness and cantankerousness, to act "queer"

So it is, Dr Appel says, with nations. Any country needs contact with others They need interchange of raw materials and manufactured goods as well as cultural give and take An attempt to keep others out and live alone in self-sufficiency breeds suspicions, aggressiveness, and delusions of national grandeur A nation, like an individual, can get to be touchy and cranky and spoiling for a fight It is not a healthy state—this attempt to persist in horse-and-buggy international relations in an atomic age

It is not just the patient who has become "fixated" on childish habits of thinking and attitudes, or the schizophrenic who withdraws from human contacts to live in a dream-world within himself, who has parallels in the public life of nations

There is also the maniac patient with exaggerated ideas of his own knowledge or power. You may be able to think of international incidents brought to mind by this young man's case

He had been brought up in an indulgent atmosphere Both money and affection were lavished upon him by his parents who encouraged him in the idea that he was an extraordinary person. He became thoroughly convinced of his own powers and believed himself adequate for any situation

When the great depression descended upon the country, he was going to save the nation and the world So he conceived a grandiose scheme of granting unlimited credit to business in this country and to unfavored nations throughout the world Lavish spending was to go along with this unlimited credit—a point of view which, Dr. Appel says, has not been unknown in our own political life To keep his imaginary "pot of gold at



PRESERVING THE PEACE—A psychiatrist who has studied the world's "globalunacy" prescribes international collaboration as the only protection against insane nations. Here U. S. delegates leave for the United Nations Assembly where this problem is one of the most serious being discussed. Photograph by Acme.

the end of the rainbow" always showering wealth and the good things of life on the people, it was only necessary, this man felt, to ask Congress for appropriate legislation. It doesn't take a psychiatrist to see the connection between this impractical view of life and the fact that in childhood he had always gotten everything he wanted simply by asking his parents to give it to him

The Government, to this man, was just a benevolent, indulgent mother standing always ready to hand out bread and molasses

This phantasy or delusion was indulged to such a degree that nurses and drugs had to be employed to prevent him from imposing these world-saving ideas on others, and to restrain anger that resulted when he met with refusal. Finally a guardian had to be appointed to conserve his financial resources, and he was hospitalized

Children universally like fairy tales and the comic strips in which Cinderella and Superman can accomplish anything by means of magical powers given them by a fairy godmother or a uniform.

Adults, if they are normal, outgrow these ideas. As they gain strength, and competency, they learn to depend upon hard work and hard thinking instead of wishing to solve their problems But those who are weak and incompetent do tend to cling to their childish ways They may not actually cross their fingers, or wish on a star or carry a rabbit's foot, but they will still rely on asking favors of relatives and friends, or the church and the government And they have a simple faith in the power of their own fantastic imaginings

When statesmen have a similar disregard for reality and build grandiose schemes for a "new world order" in which they are going to conquer the world, wipe out whole peoples, control thought and establish themselves as supreme dictators, the insanity that results is costly not just to individuals but to the whole world

How are such madmen and insane nations to be controlled? Dr. Appel has suggestions for this, too, drawn from his experience with mental patients

"The only way of dealing with aggressive nations," he says, "is through realistic collaboration and agreements between other nations This is collaboration and not isolationism"

And isolationism, Dr Appel feels, can be overcome only when each nation faces realistically the actual limits of its own powers.

"The old idea," he says, "of sovereignty, namely, that no one can tell us what we must do or can do, that we are and will do what we please, is tragically refuted by the war Actually, we cannot do just as we please

"The old idea of sovereignty is much more represented by the realistic phrase, 'We will do what we can with existing limitations' Practically, it has always been the latter, but we euphemistically and narcissistically use the former phrase when we are talking"

Freedom of individuals is always within limits provided by society If a man imposes too much on the rights and interests of others, he will land in a court of law, in jail or in a mental hospital If a nation imposes too much on the rights of other nations, it will land in war Since other nations will usually band together against such aggression, the freedom of a dominating, power-crazed nation will ultimately be lost completely in defeat

"Psychiatry teaches that only through the control involved in compromise and accommodation with his fellows can the individual achieve success and satisfaction—the same should apply to nations"

Science News Letter, February 9, 1946

Some varieties of *fungi* grow in bags created by themselves which, when full grown, burst to send thousands of spores floating through the air

Some 30 firms in Belgium interested in the production of fuel or power are creating a scientific center to investigate the possibility of gasifying *coal* in the seam underground

YOUR HAIR and Its Care

By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT! If you want healthy hair, lovely hair, then you need the expert advice in this book

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as

Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc., etc.

Medical science is better equipped today than ever before to prevent trouble above the hair line, or, should some difficulty already have arisen, to deal effectively with it

"A worthwhile book full of important information" —Ohio State Medical Journal.

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Do You Know?

Hydrogen cyanide is used to control parlatoria scale on olive trees.

Powdered dried red *blood cells* have been dusted on wounds to hasten healing.

Citrus fruit production in the United States increased seven-fold in the past 30 years

Over 2,000,000 tons of fine *alloy steel* were used in the United States during the war to build airplane engines and airframes

Dolomite found in northern Chile is said to be the only deposit in South America; it is of a good quality and is used to make hydraulic cement

Scrap metal from partly completed military aircraft not needed by the Army because of the end of the war is being salvaged and sold, all usable equipment is first removed.

Shipbuilding consumed more steel during the war than any other single industry, of the more than 35,000,000 tons used in shipbuilding, approximately three-fifths went into merchant ships.

The lowly *coot,* or mudhen, might be called the "whitebill", it is suggested, to make this edible but unpopular fowl more acceptable on the dinner table; the coot is the third most plentiful waterfowl in America

The name *"strawberry"* does not come from the common practice of using straw to mulch the plant, as many believe, but from the runners of the plant which at a certain season somewhat resemble scattered straws.

NEW "PICK-UP" CANE

Permits Disabled Persons To Pick Up Small Articles Without Painful Stooping

NO OTHER CANE LIKE IT

The Mason "Pick-Up" is a light double purpose cane with concealed patented pick up mechanism that enables the user by simple finger pressure and without any stooping to easily pick up papers, pencils, cards, coins, etc Proper balance and rubber grip tip insures safer walking. Use a beautifully finished Mason "Pick-Up" Cane yourself or as a perfect gift for a disabled service man or friend. Write today for FREE CIRCULAR and 5 DAYS TRIAL OFFER.

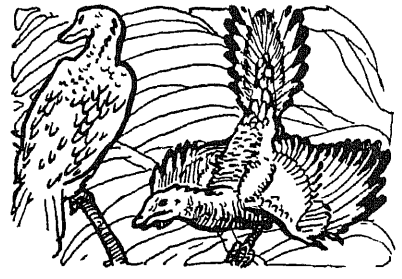
W. H. MASON Box 27, Leesburgh, Ohio



EVOLUTION

NATURE RAMBLINGS

by Frank Thone



Clothed for Coolness

➤ FEATHERS on birds and fur on beasts were evolved not to keep their wearers warm in a world that was growing colder but to enable the original, half-reptilian ancestors of present-day warm-blooded animals to stay out in the sun a little later in the forenoon without dying of heat-stroke This theory, directly opposite to the one set forth in most zoology books, is offered by Prof. Raymond B Cowles of the University of California at Los Angeles. (*Science,* Jan 18).

The idea that feather and fur were developed to meet a need felt by their wearers strikes Prof Cowles as a little too pat. It follows the Lamarckian line of reasoning, which seemed valid when first proposed, well over a hundred years ago, but which has been pretty well abandoned New mutations, most biologists now believe, "just happen"—and if one of them by chance helps its possessor in the struggle for existence, that's *his* good luck. But mutations aren't made to order.

A mutation that resulted in the development of fur or feathers would prevent the glare of a hot sun from reaching the animal's skin and thus enable the wearer to keep on hunting food after the heat of the day had begun, Prof. Cowles suggests This would have an obvious survival value. Of course, such a heat-insulating layer would work both ways, and when the climate took a change for the cooler a new kind of survival value would attach to it

There is reason to suppose, Prof. Cowles argues, that warm-bloodedness in animals is of comparatively late evolutionary origin. An examination of all the higher vertebrate groups shows that the more recent, highly evolved members are also the warmest-blooded, while the more primitive types are nearer to the reptiles in the way their body temperatures react Also, the young of some animals, especially nestling birds, are for a time less warm-blooded in their physiology than birds, and do not become completely warm-blooded until some time after hatching.

Science News Letter, February 9, 1946

From Page 89

When you try this selection of questions from the examination you should, therefore, not expect to find that you have checked all the right answers

To save your time, only typical questions out of the original three-hour examination are reproduced on this page You should be able to answer the 30 questions in about 40 minutes

Don't read further Cover up the following paragraph until you have taken the test

The correct answers to part A are: *1*, 1; 2, *4*; 3, *4*; 4; *5*, 2; *9*, 2, *10*, 3; *11*, 4, *12*, 3; *13*, 1; *36*, 2, *37*, 2, *38*, 1, *39*, 2, *41*, 3, *42*, 3, *43*, 1. The right answers to Part B include: *51*, 3; *52*, 2; *53*, 4; *54*, 1; *55*, 2; *56*, 2; *57*, 2, *58*, 3; *59*, 4. In Part C, the correct answer to the first three questions can be any one of the following, or anything similar to it *101*, none, no conclusion is possible, increased output due to chance, no conclusion without data from control group; *102*, barometric pressure, *103*, V, V velocity, velocity V, same velocity. The items in column I of question *104* should have the following numbers beside them in this order 3, 2, 1, 5, 11, 10, 4, 8, 9, 6, 7

If you answered correctly 22 of the questions, you did about as well as the average high school student completing the examination Those of you who got only ten correct did no worse than some of the contestants with lowest scores. Anyone giving the proper answer to 27 of the questions probably is gifted in science But remember, the questions given here are the easier ones included in the examination.

Science News Letter, February 9, 1946

Celery tops can be dehydrated and used as human food or feed for cattle.

Jack *pines* produce cones at an early age; as the trees grow older, woody tissues engulf the old cones along the main trunk and eventually completely entomb them in the trunk wood.

ENGINEERING

New Heating System

Chemical liquids which vaporize at high temperatures may replace water in home heating plants. Radiators may be warmed by high volatile liquid.

➤ HOME OWNERS who now rely upon water and steam to warm their radiators and baths may find chemical liquids which vaporize at high temperatures for future mediums for conveying heat in their houses

Engineers convening in New York for the 52nd annual meeting of the American Society of Heating and Ventilating Engineers heard a report on developments in the domestic power field by Orion O. Oaks of the John B Pierce Foundation Experiments by the Foundation were begun early in the war in conjunction with the Office of Product Research and Development of the National Housing Agency with a liquid known at tetra-cresyl silicate This liquid, which may be heated up to 817 degrees Fahrenheit without vaporizing, may well change domestic heating practice

Two other chemicals are being experimented with for possible domestic application They are Dowtherm A and Dowtherm E, products of the Dow Chemical Company, now used in industries concerned with molding plastic products, cooking varnishes, processing foods or other high temperature operations Dowtherm A is a mixture of 73 5% diphenyloxide and 26.5% diphenyl Dowtherm E has the chemical formula $C_6H_4Cl_2$ (inhibited orthodichlorbenzene) Use of such chemicals, while not new in industry, is new in domestic practice.

Using such "fluid heat" methods, a home could be powered from one source of heat The independent power plants of the kitchen refrigerator, stove, dishwasher and washing machine might be eliminated In their place would be a consolidated, single-fluid heating unit which would provide energy for every appliance, including the iron Special tubing, instead of present electrical wiring, would carry the energy in the form of heat in the liquid around the house.

For use in home units a chemical such as tetra-cresyl silicate or Dowtherm must have high and controllable temperatures with relatively low pressures Uniformity, non-toxic and non-poisonous characteristics are required. The liquid must have a boiling point many degrees higher than the highest working temperature and be of a permanent chemical structure It must also be inactive toward materials used in fabrication

Power and light are planned to be possible with installation of additional equipment Success in this field would aid many farm communities and areas where power lines do not run A saving of 48% in favor of liquid heat over anthracite coal is claimed by the Pierce Foundation in their experiments, and such savings would offset any added expenditures in installation of equipment

Home unit are still in the development stage, according to Clarence W Farrier, Technical Director of the National Housing Agency One utility core unit consolidates the household heating, plumbing, electrical, bath, kitchen and laundry elements in a space no larger than a closet Prefabricated, it can be rolled through the house framework during the building period

This unit, being developed by the Ingersoll Division of the Borg-Warner Corp, could use fluid heat should application seem feasible A unit known as the Grebe Plan, still in the development stage at the Dow Chemical, Midland, Michigan, plant, put all the kitchen and bath equipment in a U-shaped unit eight by 12 feet and about room height The Pierce unit would operate any appliance that utilizes heat, including steam and hot water boilers

Use of liquid heat would allow various equipment to be integrated into one unit so that piping connections and other parts, including actual appliances, could be factory installed This would reduce the inefficiency of poor field connections and eliminate numerous separate installations Continued developments promise great savings and added comfort for home owners of the future

Science News Letter, February 9, 1946

CHEMISTRY

Ammonium Nitrate in Liquid Ammonia as Fuel

➤ A COMPLETELY revolutionary idea for fueling internal combustion engines is embodied in U S patent 2,393,594, issued to Dr Clyde O Davis, a chemist in the employ of E I du Pont de Nemours and Company, to which firm he has assigned rights in his invention

Dr Davis' proposal is to use as fuel a solution of ammonium nitrate in liquid anhydrous ammonia Since ammonium nitrate contains oxygen which can be liberated and immediately recombined with the other elements, such an engine would need no outside source of oxygen, and could operate in the higher stratosphere, in submarines and in other places where air intakes present serious problems Such an engine would be making use of the principle already successfully applied in guns and powder-propelled rockets; for powder also contains its own internal supply of oxygen, in the form of the nitrate atom-group.

An engine of this type should be nonfouling, for the elemental constituents of the fuel are gaseous at all except the very lowest temperatures Moreover, since both ammonia and nitric acid can be made synthetically from constituents of air and water, such engines would be completely independent of a dwindling petroleum supply

Science News Letter, February 9, 1946

ANYONE CAN USE A SLIDE RULE

Absolutely no math background needed if you have the **PRACTICAL SLIDE RULE MANUAL** by J M Klock, Mathematician for the U S Navy and former instructor in the Detroit Public Evening Schools An absolutely non-technical explanation of how to use a slide rule for the fundamental math calculations **STUDENTS** of all math, science, and technical subjects will find the use of a slide rule to be a great aid in their work. **SHOP AND TECHNICIANS.** special applications made to formulae from mathematics, engineering, aeronautics, air navigation, etc The slide rule gives rapid solutions to all the basic formulae. **OFFICE** and business administration applications are numerous The slide rule is especially valuable in per cent and interest work, and cost accounting The booklet includes chapters on these subjects The slide rule is also a valuable rapid estimator

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• Books of the Week •

APPLIED ENERGY CONVERSION A Text in Power Plant Engineering—Bernhardt G A. Skrotzki and William A Vopat—*McGraw,* 509 p, diagrs, and illus, $5 The equipment and economics of industrial and central station power plants and the coordination of equipment for the generation of energy from a physical and economic viewpoint

THE BALANCE SHEET OF AGRICULTURE 1945—U S. Department of Agriculture, Bureau of Agricultural Economics—*Government Printing Office,* 44 p, charts and diagrs, 10 cents The first of a series of annual reports whose purpose is to contribute to an understanding of the financial condition of agriculture viewed as a single industry

BIBLIOGRAPHY OF INDONESIAN PEOPLES AND CULTURES — Raymond Kennedy—*Yale Univ Press,* 212 p, maps, $2 50. Yale Anthropological Studies, Vol 44

BUILDING YOUR MARRIAGE—Evelyn Millis Duvall—*Public Affairs Committee,* 31 p, illus, 10 cents A guide for newlyweds and other young people based on research findings by the National Conference on Family Relations, intended to supplement the counsel of family experts, clergymen, and physicians Public Affairs Pamphlet No 113.

A COMPARATIVE STUDY OF HUMAN REPRODUCTION—Clellan Stearns Ford—*Yale Univ Press,* 111 p, $1 50 Yale University Publications in Anthropology No 32

DIAGNOSTIC PSYCHOLOGICAL TESTING—David Rapaport, Merton Gill, and Roy Schafer—*Year Book Publishing Co,* 1088 p, 2 vol, tables, $6 50 The theory, statistical evaluation and diagnostic application of a battery of tests. The Menninger Clinic Monograph Series, No 4.

ELECTRIC CIRCUITS AND MACHINES—An Introduction to Practical Electricity—Eugene C Lister—*McGraw,* 358 p, diagrs and illus, $3 50 An overall picture of the electrical field The mathematics is limited to simple algebra

THE EXPERIMENTAL HEALTH PROGRAM OF THE UNITED STATES DEPARTMENT OF AGRICULTURE—*Senate Committee on Education and Labor,* 166 p., charts, free An analysis of the six experimental county-wide rural health programs located in counties in Texas, Georgia, Mississippi, New Mexico, Arkansas, and Nebraska

ELECTRONS IN ACTION—James Stokley—*McGraw,* 320 p, diagrs and illus, $3 An account of what electrons are and where they come from and discusses the elements and characteristics of electron tubes and their applications in the many fields of electronics.

EXPLORING OUR WORLD—Samuel Ralph Powers, Elsie Flint Neuner, Herbert Bascom Bruner, and John Hodgdon Bradley—*Ginn,* 522 p, illus, $1 44 Adventuring in Science, Book I A text book in natural science for use in the grade school, fully illustrated and giving many suggestions for individual projects

KEEPERS OF THE CORPORATE CONSCIENCE —Raymond W Miller—*Island Press Cooperative,* 19 p, $1 paper, $1 50 cloth A discussion of the public relations of the corporation in America

MONOGRAPH OF THE FAMILY MORDELLIDAE (COLEOPTERA) OF NORTH AMERICA, NORTH OF MEXICO—Emil Liljeblad—*Univ of Michigan Press,* 229 p, illus, $2 Miscellaneous Publications, Museum of Zoology, University of Michigan, No. 62.

PRACTICAL APPLIED ELECTRICITY—*Coyne Electrical School,* 7 vol, diagr., charts, illus, $19 75 For home study and reference use covering the entire field of electrical installation, operation and maintenance

STATISTICAL METHODS—Applied to Experiments in Agriculture and Biology, by George W. Snedecor—*Iowa State College Press,* 485 p, charts, $4 50. 4th ed This book aims to furnish the novice with a smoothly working combination of experimental data and statistical method

SURFACE ACTIVE AGENTS—Theoretical Aspects and Applications—C B F Young and K. W Coons—*Chemical Publishing Co,* 380 p, charts and illus, $6 Information about the origin, effects, and utilization of surface-tension phenomena in a diversity of industrial fields

TWO-WAY RADIO—Samuel Freedman—*Ziff-Davis,* 506 p, diagrs and illus, $5 The mechanics and applications of two-way radio for the different forms of fixed or postable communications are presented non-mathematically for users of such facilities

WILEY TRIGONOMETRIC TABLES — *John Wiley,* 117 p, $1, 2nd ed Ten trigonometric tables, to five places, including logarithmic tables, tables of powers and roots, S and T tables, frequently used constants, haversines and mils

Science News Letter, February 9, 1946



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ASTRONOMY

American Astronomer Decorated by Mexico

➤ DR HENRY NORRIS RUSSELL director of Princeton Observatory, was decorated with the Order of the Aztec Eagle, Mexico's highest award to persons outside that country, by Dr Espinosa de los Monteros, Mexico's Ambassador to the United States, at the dinner of the American Astronomical Society held in New York

During the dinner, Sr Luis Enrique Erro, director of the Mexican Astrophysical Observatory at Tonanzintla, Puebla, Mexico, presented a check for $1,000 to the Henry Norris Russell Lectureship Fund as a gift from Mexico's president, Manuel Avila Camacho, for the establishment of a lectureship honoring the Princeton astronomer Dr Harlow Shapley, president of the American Astronomical Society, received the check as chairman of the lectureship fund. Dr Shapley, director of the Harvard Observatory, is also a member of the Order of the Aztec Eagle

In decorating Dr Russell, the Mexican Ambassador cited the American astronomer for his contributions to astronomical science and for his cooperation with Mexican astronomers and his interest in the Mexican people

Science News Letter, February 9, 1946

Carbonyl iron powder, first made in this country in 1941, has unusual magnetic and electrical properties, it is claimed, that make it ideal for use in manufacturing electro-magnetic devices.

Several thousand tons of captured German and Japanese *synthetic oil* fuel plants and laboratories have been brought to America to be used in the synthetic liquid fuels research and development program.

GENERAL SCIENCE

Odd Questions Aided War

Far-travelled scientists and missionaries revealed important information about out-of-the-way lands to aid in winning the war. Answers were kept restricted.

➤ WHAT kind of hospital facilities and police systems are there on Greenland? Where is a man who can speak Fiji? Who can set up a child care program in Albania? How do you make snowshoes for horses? What is the origin and meaning of the name "Guadalcanal"? Where can we find a map of Copenhagen that shows art galleries and museums?

In order to answer such questions, the War and Navy Departments needed to know who had been where, how long, doing what So more than 5,000 explorers, scientists and missionaries were rounded up to give specialized information required for winning the war, through the offices of the Ethnogeographic Board This group of scientists was sponsored by the Smithsonian Institution, the National Research Council, the American Council of Learned Societies and the Social Science Research Council The Board completed the final report and critical summary of its work, and went out of existence on Dec 31

According to its director, Dr Henry Collins of the Smithsonian Institution, the Board answered hundreds of improbable questions for all the war-making agencies of the Government, ranging from information about the native process of making sago from sago palms, to requests for pictures and descriptions of Alaskan islands showing the terrain suitable for construction of air fields

Aiming at promptness in answering these world-embracing questions, the list of 5,000 explorers was arranged by geographic area as well as alphabetically Indexed under the name of an island in the Southwest Pacific, for instance, there might appear the names of a bird hunter, a shell collector, an anthropologist, an oil geologist and a missionary, with the dates of the days, weeks or years they had spent on the island, and the sort of things they would be likely to know about it.

If the Navy wanted to know about the beaches, the weather, or the language and trading habits of the natives on such an island, the staff of the Board looked on their cards for its name, found the names of the people who had been there, and looked for the answer in the books or articles written by the most likely one of them If the answer wasn't there, the man himself was called upon, or written Franked envelopes addressed to the Government office which had asked the question were enclosed to speed up answers, and also to reassure answerers that the question was official.

Once there came up certain strategic questions about one of the uninhabited Aleutian islands, which had been visited by only a few Americans in its history. Only one of these men was available, a man who had been there recently to study the habits of the sea otter and other animal life The same day the question was asked, an Army officer flew from Washington to Wyoming to interview the sea-otter man, but not about sea otters.

For certain parts of the world, notably the Pacific islands, detailed information and lists of people were ready to use, also indexed by areas Often the answers to odd questions were right on the cards, but the questioner was always given the source so that he could ask other questions if he wanted to

At one important point in the progress of the war, a missionary was found who was able to supply much-needed photographs of the harbor of an enemy-held African city.

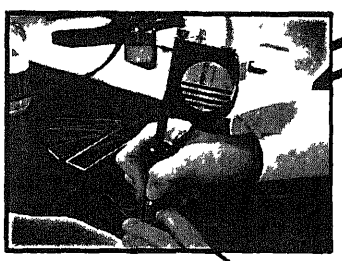
The Weather Bureau itself asked advice on how to get information on weather conditions in certain remote areas. The director of the Board furnished a sample of observations in Alaska from his own diary, and added a list of names of others who might have similar data on many parts of the world

Now and then the Board had to answer a question by saying there was no information available, but most frequently the staff could call up someone and have the answer the same day Some of the questions seemed trivial, but the answers were important enough to be kept restricted until the war was over

Science News Letter, February 9, 1946

Transoceanic air traffic may increase *foreign pests* to American crops.

Niacin, used as a vitamin, is nicotinic acid, which derived its name from the fact that it was originally prepared by the oxidation of nicotine



The BURGESS vibro-tool for the LABORATORY

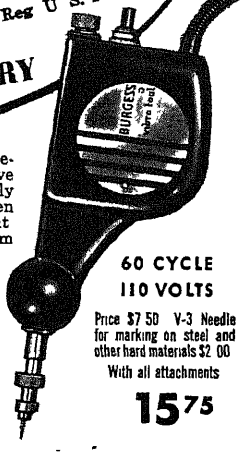
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Science News Letter, February 9, 1946

⚙ *HOSPITAL TRAY for serving food to bed patients is made of a melamine plastic with an 18% addition of phenolic resin It contains six deep separate compartments to hold different foods It can be safely washed in boiling water, and it imparts no taste to foodstuffs served in it.*

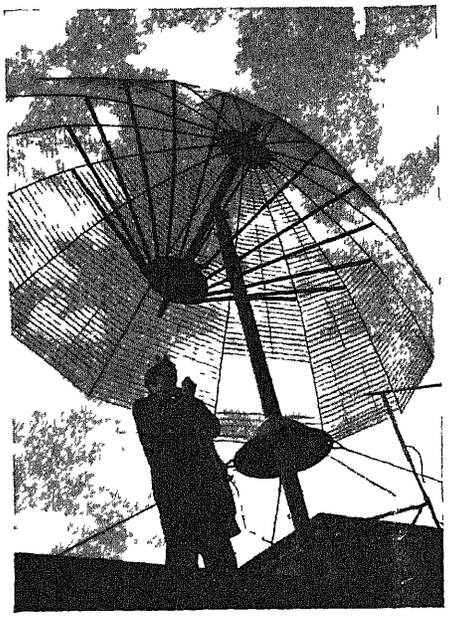
Science News Letter, February 9, 1946

⚙ *DAY-NIGHT distress signal gives from the same five-inch cylindrical container either a stream of orange smoke or a bright red flare. The smoke emits from one end, the flare from the other To set off either, a paper cap is removed from the proper end, and a flip-ring pulled over the edge of the can.*

Science News Letter, February 9, 1946

⚙ *FILMETER measures electronically the thickness of various coatings, which are electrically non-conductive, or non-magnetic metals such as aluminum and copper The coatings may be paint, varnish, lacquer, ceramics or plastics. The heart of the apparatus is a battery-operated electronic beat-frequency oscillator*

Science News Letter, February 9, 1946



⚙ *RADAR UMBRELLA, a light portable unit developed especially for beachhead use, is used both as a reflector in sending out shortwave radio pulses and as a receiver to catch wave echoes reflected from enemy targets The unit's rotating umbrella-like antenna is shown in the picture.*

Science News Letter, February 9, 1946

⚙ *KNITTED toe mitt, just patented, may be worn either inside or outside the stocking when an open-toe shoe is used, to reduce the wear of the stocking. It has a closely woven silk edging that fits snugly around the base of the toes to hold the mitt in place?*

Science News Letter, February 9, 1946

⚙ *POWDER for cleaning carpets without removal from the floor is used in solution and is applied by means of a rotary brush. It removes ordinary soil and also disinfects, deodorizes and de-moths, all without injuring the texture or coloring of the carpet.*

Science News Letter, February 9, 1946

⚙ *LOADING DEVICE to assist in putting heavy packages in an automobile rear trunk is a movable platform. It can be pulled out of the trunk into an accessible position behind the car by means of small rollers operating in channel tracks.*

Science News Letter, February 9, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 297*

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Question Box

ARCHAEOLOGY

How old are the Easter Island relics? p 83.

ASTRONOMY

How will the new theory of relativity be tested? p 84

What American astronomer was recently honored by Mexico? p 94

Where will the Executive Committee of the International Astronomical Union convene this spring? p. 85

BIOCHEMISTRY

What drug will go into full scale production this year? p. 84.

ENGINEERING

How may ships and planes be guided without human assistance in the future? p. 87.

What new heating system may be used to warm radiators in homes? p. 93

GENERAL SCIENCE

How did odd questions aid the war effort? p 95

MEDICINE

What deadly virus has been isolated for the first time? p. 82

PHYSICS

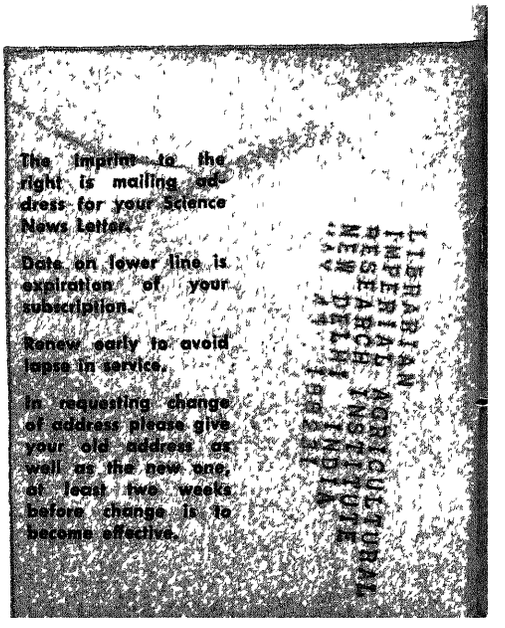
How will thermometers be used to measure the speed of jet planes? p 86.

What new gas has been detected in the earth's atmosphere? p 83.

PSYCHIATRY

What is the only way to cure globalunacy? p. 90.

Where published sources are used they are cited.



SCIENCE NEWS LETTER

Vol. 49, No. 7

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 16, 1946



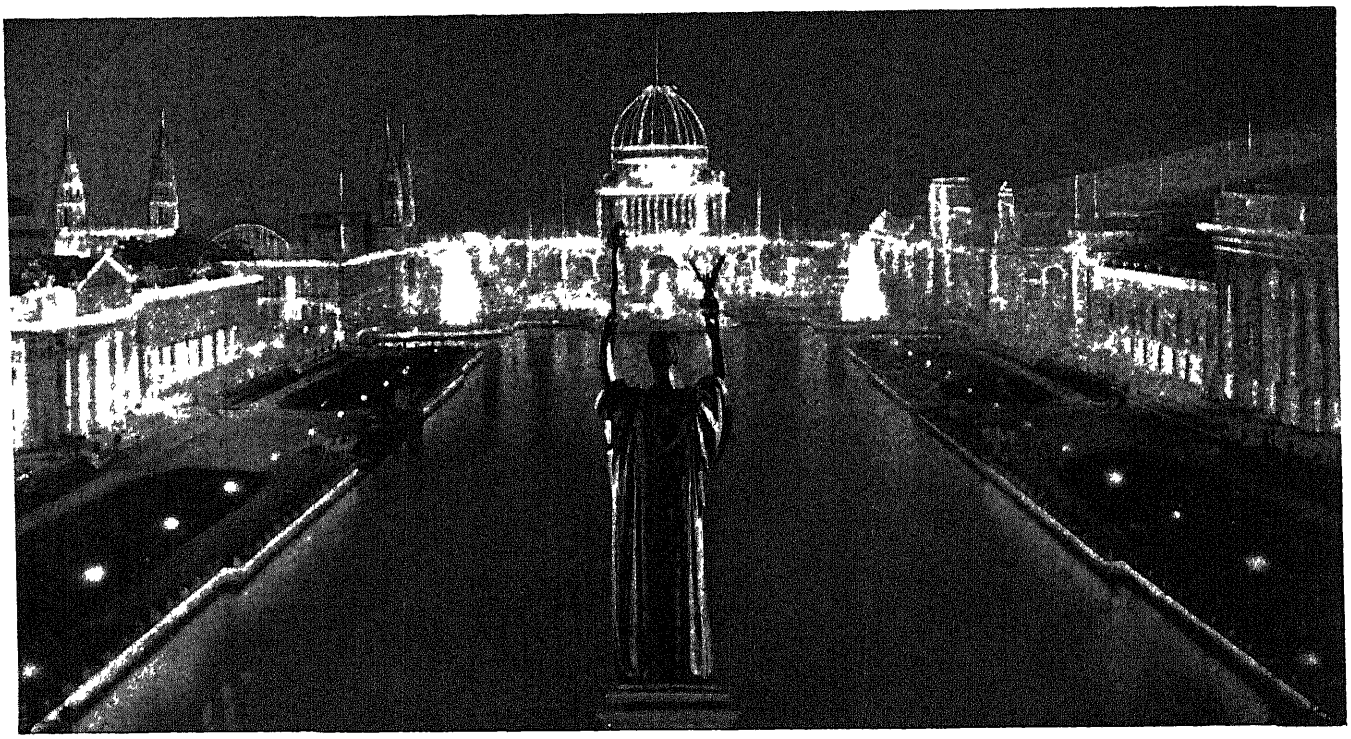
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See Page 105

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946

1846—GEORGE WESTINGHOUSE CENTENNIAL—1946



And suddenly—a wonderland of light...

It was an unforgettable sight that greeted the crowds at the Chicago Columbian Exposition, back in May, 1893.

For suddenly 250,000 incandescent lamps — more than there were in *all* the rest of *America* at that time — blazed in the night. They transformed the World's Fair Grounds into a gleaming wonderland of light.

George Westinghouse had done it again. Overcoming tremendous obstacles, he had accomplished the "impossible" . . . *in one short year.*

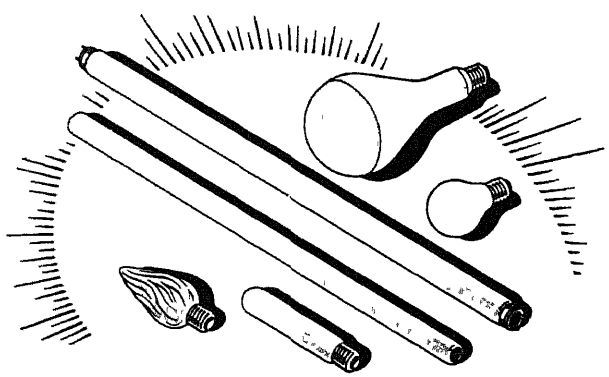
Using an entirely new principle, this great inventor-engineer had developed a completely *new type* of incandescent lamp—the famous "stopper lamp" And he had equipped a new glass factory to turn them out by the hundreds of thousands!

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AERONAUTICS-METEOROLOGY

All-Weather Flying

The AAF now has facilities to maintain flying under all conditions of weather and visibility. Wartime developments may make it a postwar reality.

➤ ALL-WEATHER FLYING, a dream of airmen since the first invention of flying machines, may become a postwar reality as American aviation uses and develops wartime discoveries in the fields of aircraft construction and aerial navigation

Maj Gen Curtis E LeMay, deputy to the commanding general of the Army Air Forces for research and development, has declared that the AAF now has facilities to maintain flying under all conditions of weather and visibility To consider the feasibility of all-weather flying and discuss wartime developments in the field, the Army Air Forces invited military and civilian aviation experts to a week-long conference in Washington

Though much research and inventive genius will be required before commercial airlines can run all-weather schedules, the war's discoveries point to the day when fog, wind, rain and snow will no longer ground flights To the armed forces, all-weather flying would permit continuous flying operations and end the "scrubbing" of flights, as flyers in the war called their cancelled missions

Wartime discoveries and inventions, picturesquely labelled with abbreviated names, will serve as the base from which American science can work toward all-weather flying Radar, loran, shoran, and many other less-publicized instruments and systems that were vital to victory over enemies in war may bring peacetime victories over the forces of nature, the greatest enemy of continuous flight operations

To demonstrate what can be done under the classic condition, "ceiling zero," the Army Air Forces have landed large planes with blindfolded pilots at the controls Using a ground-controlled radar system, planes can be "talked down" to perfect landings by a control operator on the airfield

Radar, most famous of the revolutionary aids to navigation produced during the war, is a radio transmitter and receiver unit sending out radio waves and reflecting them back to indicate surrounding objects for many miles. On his radar screen, the pilot may "see" his surroundings in the most blinding weather conditions

Already, the Civil Aeronautics Administration has begun research to develop radar's use in peacetime aviation Radar both on the ground and in the planes is the prospect for flying in the near future

Similar to radar is a system for determining geographic position, loran The loran system sends out radio pulses from fixed ground points that are picked up by receivers on planes These receivers measure the time of arrival of the pulses from the known transmitting points, permitting the navigator to plot his position on special charts

Because ground waves have a range only one-fourth as great over land as over water, a refinement in loran was necessary for overland flying operations This development, SS Loran, uses waves from the loran transmitters that are reflected downward from the upper strata in the atmosphere

In shoran, a short-range navigational aid used successfully in the bombing of Berlin and other German targets, a plane transmits two signals to ground stations These signals, transmitted back to the plane, are computed by a special receiver that gives an accurate figure of the distance from the plane to the two stations

Discoveries during the war relating to high frequency radio have already led to a definite plan for America's postwar airports The Civil Aeronautics Administration has announced plans for a ground-to-plane, high frequency landing system to be installed at 12 major airports The new system will permit faster landing schedules on airport runways in overcast weather

Throat microphones, transmitting the vibrations of the larynx instead of the voice from the mouth, permit accurate communication in a plane under the most noisy conditions and will be a small but important contribution to flying under adverse conditions

Whether all-weather flying becomes feasible soon or not, radar and related electronic equipment produced during the war are proving valuable in forecasting weather and predicting storms Reconverted to peacetime use, the war's developments in aviation mean safer, more continuous flight operation pointed toward all-weather flying in the future.

Science News Letter, February 16, 1946

ASTRONOMY

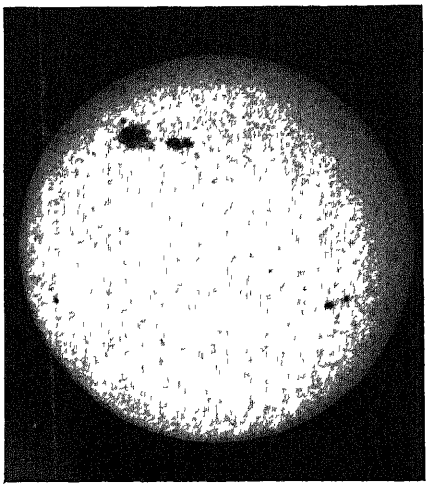
Large Group of Sunspots Now Clearly Visible

➤ SUDDEN INABILITY either to send or receive shortwave broadcasts, experienced during the last week or two, may be blamed on a group of sunspots large enough to be seen plainly through smoked glasses

The blackout of shortwave broadcasts was predicted when the group first appeared on the northeastern limb of the sun on Jan 29 The worse magnetic disturbance occurred between five and six o'clock the morning of Feb 7, according to radio experts at the National Bureau of Standards At that time radio transmission began to deteriorate noticeably, followed by a complete blackout of messages from London, Berlin and Moscow.

On top of the magnetic storm was superimposed occasional sporatic disturbances The exact time of these blackouts could not be predicted, but they occurred only during the hours when the path of the radio waves passed through a daylight zone.

Science News Letter, February 16, 1946



CLEARLY VISIBLE—The spots in the upper right edge of the sun are large enough to be visible through smoked glasses or fogged camera film. They are the first large group since March, 1940, when seven spots appeared and radio, telephone and teletype communications were snarled for several days. Photograph by U. S. Naval Observatory.

MICROSCOPY-BIOLOGY

Movies of Cell Life

Speeded-up motion pictures show repair of injured nerve fibers, rescue of "lost" blood corpuscles and other life dramas under the microscope.

➤ MOTION PICTURES of the self-repair of injured nerve cells, the rescue of red blood corpuscles "lost" in body tissues outside their regular channels, and other intense little life dramas as seen through the microscope were shown before the University of Cincinnati chapter of the Society of the Sigma Xi, national science honor society, by Prof Carl Caskey Speidel of the University of Virginia.

The pictures were made by the time-lapse or fast-motion method, in which one frame of the motion picture film is exposed every two, four or eight seconds When the finished film is projected at normal speed of 16 frames a second, from a half-hour to two hours of life and action are compressed into a viewing time of one minute Prof Speidel first began work on his micro-motion films in 1932, and he now has a library of 10,000 feet of carefully selected and edited pictures, both colored and monochrome, covering a wide variety of biological subjects

In the nerve-injury films, an anesthetized frog tadpole is held on a glass slide before the microscope, which is carefully focussed on nerves in its flat, transparent tail Re-growth of fibers injured in various ways has been recorded Of special value in medical work are pictures showing nerve self-repair after injury by the three "shock" methods used in the treatment of some forms of insanity· insulin, metrazol and electricity.

Sometimes, in connection with other types of injury, red blood corpuscles come out of the capillaries and become lost among the cells of other tissues Helpless to get back into circulation themselves, yet too valuable to abandon, they are literally saved by the building of a rescue road From one of the smaller lymph vessels, the body's auxiliary circulatory system, a short outgrowth pushes its way among the cells to the place where the lost corpuscles are A channel develops down the length of the outgrowth, and through it the rescued corpuscles move back into circulation If, however, they are so situated that they cannot be rescued in less than two days they have to be given up as lost, and what might be termed a burial party of white corpuscles makes its way out to them and disposes of them

Several sequences in Prof Speidel's films showed the complex process of mitosis or division in different types of animal cells, both under normal conditions and after injury by such medically important agencies as electric shock, mustard gas, sulfa drugs and starvation. These shots of cell life also included the last act of all, the death of the cell

Science News Letter, February 16, 1946

MEDICINE

Mouse Studies Suggest Polio Susceptibility

➤ SUSCEPTIBILITY to infantile paralysis, or polio as it is also known, is greater in summer because of the effect summer heat has on body chemistry, Dr D Frank Holtman, of the University of Tennessee suggests (*Science*, Feb 1)

His suggestion is based on studies of the effects of temperature on polio susceptibility in mice

Mice acclimated to a temperature of 55 4 degrees Fahrenheit, and living in that temperature after inoculation with polio virus, never showed symptoms of paralysis in less than 11 days Not until 13 days after inoculation had the mortality reached 50%

In contrast to this, a group of mice adapted to a temperature of 71 6 degrees Fahrenheit had a 50% mortality at the end of seven days and a group of mice acclimated to a temperature of 89 6 degrees Fahrenheit began showing symptoms and dying as early as the fifth day

Metabolism, that is, physical and chemical processes such as those involved in the conversion of food into tissues and energy, goes on at a faster rate upon exposure to cold and at a slower rate when the temperature rises In view of this, Dr Holtman believes his findings with the mice mean that the rapid growth of polio virus in the body and resulting symptoms of disease are dependent on a disturbance of the normal metabolism of the body, such as that occurring in humans living in the temperate zone when the temperature shifts from the cool temperatures of spring to the heat of summer

The same explanation holds good for the fact that children in the five- to nine-year age group are most often attacked by polio This age, Dr Holtman points out, is the period when the rate of metabolism is declining rapidly, after reaching a peak at about the age of five

Science News Letter, February 16, 1946

Succulent plants, particularly lilacs, and certain cut flowers can be kept fresh for many extra hours by a vacuum treatment in which air in the plant tissues is replaced by water

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NUTRITION

Fewer Vitamins in Bread

Dozens of problems will result from changing our basic flour to help feed Europe. It may be necessary to add calcium, and we will get fewer calories.

➤ IN CHANGING our basic flour to help feed starving Europe, dozens of problems are presented to millers, bakers, nutritionists and housewives of America

Fewer vitamins from our daily bread as well as fewer calories may be one result Our present enriched white bread made from 72% extraction flour supplies about twice as much thiamin, or vitamin B_1, and pellagra-preventing niacin and probably more of another vitamin, riboflavin, as the new 80% extraction flour will The 80% flour of course could be enriched but that may bring fresh problems, both legal and technical

The nation's nutrition authorities apparently were not consulted about this move as they were on food and nutrition problems during the war Some are worried over whether we shall lose the benefits of the flour enrichment for which they fought long and hard Nutritionists and home economics experts of the Department of Agriculture reviewing the nation's nutritional status just before the Truman order were pointing out that Americans do not yet eat enough of the foods that make for an adequate diet A statement prepared a few days before and released to the press on the same morning as the President's order states

"Families with very low incomes may run short on calories as well as on the important minerals and vitamins"

Besides concern over the vitamin content of the new flour, nutritionists wonder whether it will be necessary to add calcium to it In Britain during the war this was done with the 85% flour The reason was that the 85% flour, and possibly 80%, contains a certain amount of phytic acid This chemical combines with calcium and has a decalcifying effect on the bones and teeth, especially in children To avoid this danger, the British added calcium to their 85% wartime flour

Another question is whether Americans will eat as much bread when made of 80% flour If they do not, there may be more flour for starving Europe but Americans will be getting less than the expected amount of calories

Southerners who eat much of their bread in the form of biscuits and hot bread will find difficulty in baking these from 80% flour

Digestive difficulties, though perhaps of a minor nature, may be experienced by some who eat bread from the new flour This was the case in Britain during the war, though other features of the British wartime diet may have contributed

One advantage of the 80% flour might be its slightly greater content of protein The protein might also have a different biological value tending to make it more nutritious

Saving in wheat without too drastic change in milling processes might be achieved, it has been suggested, by requiring distribution of an average 80% flour This could be accomplished by requiring purchasers to take part of their flour in the present 72% extraction form and part of it in the form of darker flour or bran Reducing the amount of flour allowed to consumers by rationing at least as far as the retailers is seen as another way of saving wheat without changing the flour.

Science News Letter, February 16, 1946

ELECTRONICS

Electron Microscope Developed in Russia

➤ SOVIET ELECTRON microscopes, one developed during the war and used in war work, and an ultraviolet microscope, both designed at the Soviet State Optical Institute, were described at a recent meeting of the Academy of Sciences in Moscow, at which special tribute was paid to 80-year-old Soviet agrochemist, Dmitri Prianishikov, and to 75-year-old Alexander Baikov, distinguished Soviet metallurgist

The importance of physics, chemistry and technology, as distinguishing features of present scientific development, was emphasized in various papers presented at the meeting The highlight, however, was Alexander Lebedev's paper which reviewed the development of the electron microscope

The staff of the Optical Institute, he said, designed and built an electron microscope in 1940 that magnified objects 10,000 times An improved model built at the end of the war magnifies 25,000 times, and one twice as powerful will be ready for use in the near future

The ultraviolet microscope was described by E. Brumberg, its designer It is extremely sensitive, he said, and will detect the presence of infinitesimal quantities of many substances.

Another scientist discussed substances with high and superhigh dielectric conductance, and described what he called a new material, titanite of sodium, which, he said, possesses high insulating and magnetic properties.

Science News Letter, February 16, 1946



***SAVES TIME**—A new electronic computing device known as the Antennalyzer, developed at RCA Laboratories, solves the problems of locating and arranging new antennas in a matter of minutes compared to weeks of surveys and calculations heretofore necessary. Readings taken from the final dial settings tell engineers where to locate the antenna towers in order to direct maximum power in desired directions.*

The *Alaska peninsula,* that stretches along the arc of the Aleutian islands, was once a series of islands but the channels between them silted up through the action of shorewise currents and ash from active volcanoes.

CHEMISTRY

Aids for Brain Study

May yield some of the secrets of its functioning to "tracer" experiments with the radioactive by-products of atomic research.

➤ THE BRAIN, which is probably the most impervious to study of man's organs, may yield some of the secrets of its functioning to "tracer" experiments with radioactive by-products of atomic research

Scientists in the University of California Medical School have already conducted experiments with radioactive phosphorus produced in the Berkeley cyclotron. Radioactive sodium and potassium also show promise of being useful tools in the study of the brain

While the work is just beginning and it is too early to speculate on results the scientists believe the "tracer" studies hold the greatest promise in studying abnormal conditions of the brain, such as epilepsy

"Tracer" studies are made possible by the radioactivity of various isotopes, or sisters, of common elements.

A radioactive isotope of phosphorus, for example, cannot be distinguished from ordinary phosphorus, except by its radiations In the human body it acts like ordinary phosphorus However, the presence of an atom of radio phosphorus anywhere in the body can be detected recording its radiation on delicate instruments

Thus the metabolism of radio elements in the brain can be determined by the "tracer" method

The importance of learning more about the functioning of the brain is evident from figures on epilepsy alone It is estimated that over half a million people have convulsions in the United States alone, a figure approximating the number who have active tuberculosis

While more has been done in the study and treatment of the disease in the past 10 or 15 years than in all previous history, there is still little understanding of the biochemical basis of the convulsive state Epilepsy, therefore, remains largely a mystery

Science News Letter, February 16, 1946

CHEMISTRY

Molecules Reveal Secrets

Great advances in medicine and biology to come from study of sizes and shapes of molecules. Specific action of drugs explained by configuration.

➤ GREAT ADVANCES in fundamental biology and medicine will come from thorough investigation of the sizes and shapes of molecules of body chemicals and of drugs and germ-killing chemicals, Dr. Linus C Pauling, director of the Gates and Crellin Laboratories of Chemistry of the California Institute of Technology, declared at a meeting of the American Chemical Society in Rochester

Antibodies, substances formed in the body to fight invading disease germs, are protein chemicals with very large molecules, Dr. Pauling pointed out They react with the antigen of a disease germ or with a protein substance like egg white to form a precipitate in the same way that many of the ordinary precipitates the chemist meets in his work are formed. Dr. Pauling gave as an example the precipitate formed by a solution of a silver salt with a solution containing a cyanide ion. The antibody-antigen precipitate, moreover, can be redissolved by addition of an excess of antigen just as the silver cyanide can be by an excess of cyanide ion

The great specificity of interaction between antibodies and antigens, each antibody reacting only with its corresponding antibody, is like another familiar chemical process, the formation of a crystal of a substance from a solution, Dr. Pauling pointed out

After the antigen is injected into the body, antibody molecules are formed in such a way that a region of the antibody takes a configuration that mirrors a portion of the surface of the antigen molecule.

"This complementariness in structure leads to a strong attraction between the antibody molecule and the antigen, because it permits this combining region of the antibody molecule to get into close contact with the antigen molecule," Dr Pauling said "The closer that the two molecules can get in contact with each other, the stronger the intermolecular force of attraction between them

"A crystal of a molecular substance is stable because all of the molecules pile themselves into such a configuration that each molecule is surrounded as closely as possible by other molecules, that is, if a molecule were to be removed from the interior of a crystal, the cavity that it would leave would have very nearly the shape of the molecule itself Other molecules, with different shape and structure, would not fit into this cavity nearly so well, and in consequence other molecules in general would not be incorporated in a growing crystal"

"The specific action of drugs and bactericidal substances," he said, "has a similar explanation Even the senses of taste and odor are based upon molecular configuration rather than upon ordinary chemical properties—a molecule which has the same shape as a camphor molecule will smell like camphor even though it may be quite unrelated to camphor chemically"

Science News Letter, February 16, 1946

ENTOMOLOGY

Insects Hide in Woods During Winter Season

➤ WINTER finds the woods quiet and still, deprived of the cheerful humming and buzzing of an active insect world Safe in a silken sleeping bag or protected by a water-proof varnish, hidden under loose bark or cozy in tunnels chewed in rotting wood, insects pass the freezing days in a state of complete inactivity As eggs, larvae, pupae or even adults, they await spring with its flowers and warm weather

A slight swelling on a twig may be the winter quarters of hundreds of insect eggs. The mother lackey moth, for instance, binds her eggs in bracelets around a twig and covers them with a gum that hardens into a protective crust A shiny coat of glandular shellac the same color as the twig protects the eggs of the Eastern tent caterpillar against weather and other enemies, until the caterpillars are ready to emerge in April

Some insects pass the winter as larvae, hidden under stones or tunneled deep



WINTER HABITS—Baby spiders will begin to emerge in the early spring from the silken cocoon, left, which protects the eggs against the winter's cold. Next is the cocoon of the Promethiea moth. The violet-tip butterfly, right, spends the winter as an adult clinging to the stalk. Photographs by George A. Smith of Quarryville, Pa.

within the wood of a tree A winter sleeping bag of chewed wood held together with a little silk protects the larvae of the goat moth, while the larvae of the ghost moth lies in a silk-lined bed

Cocoons house quiescent pupae or chrysalids, the last stage before the insects are ready to leave in their adult form The pupae of many beetles lie in gum-varnished or silk-decorated chambers bored in a tree The larvae of some moths make an earthen cell in the ground and pupate there

Some cocoons, an uninteresting brown, are passed unnoticed amid the leaves Others are encased within curved leaves, pulled around them with silken threads The swaying cradles of the bagworm, made in this way, are bound to the twig for security by a silken thread A two-layered cocoon, with an air space between to protect the pupa from sudden changes in temperature, is built by the Cecropia silk moth.

Some insects survive the winter in their adult state The young queen of the bumblebee may lie as an adult hidden deep in a mossy bank A piece of rotten wood knocked out of place may reveal beetles that scramble quickly out of sight.

Spiders, as well as nearly all insects, hibernate in cold weather Trap-door spiders seal the doors of their burrows with silk or place a piece of their building material across the door Silken cases attached to the underside of stones or pieces of loose bark house other spiders Some spiders pass the winter as eggs, protected from the cold by a silken cocoon spun by the mother spider in the late autumn before the winter's cold overcomes her

Science News Letter, February 16 1946

PHYSIOLOGY

Conditioned Dog's Heart Beats Faster

➤ WHETHER, like the soldier in the song, he wanted to murder the bugler and spend the rest of his life in bed, is not told, but a dog in the Institute of Experimental Medicine in Leningrad was conditioned to have his heart beat faster and his blood pressure rise when he heard the sound of a trumpet call, states a report received from the Soviet Scientists Committee in Moscow

For this and other studies demonstrating the conditioned reflex theory of Pavlov, Prof. Konstantin Bykov, a pupil of Pavlov's, has been awarded the Stalin Prize.

The dog was conditioned by having adrenalin injected into a vein at the same time that a trumpet was blown. Adrenalin, also called epinephrine, is a product of the adrenal glands which stimulates heart activity and raises blood pressure After several simultaneous trumpet blowings and adrenalin injections, the trumpet was blown when adrenalin had not been injected The dog's heart nevertheless began to beat faster and his blood pressure increased.

Science News Letter, February 16, 1946

RADIO

Radio Amateurs Report First Use of Microwaves

➤ RADIO AMATEURS have made contacts over a range of 31 miles in the first use of super-high frequency microwave bands outside of military and commercial tests

A. E Harrison, W6BMS, and Reuben Merchant, W2LGF, both of the Sperry Corporation, New York, tested the new bands shortly after the Federal Communications Commission released them to amateur radio operators They first made contact at five miles and later reached 31 miles

Microwaves, used in wartime radar, are found in super-high frequencies that have not been open to amateur radio operators before Limited in distance, microwave beams are narrower than ordinary waves and permit use of smaller antennae and directional equipment not practical at lower frequencies

Messrs Harrison and Merchant used the 5250 to 5650 megacycle band in their first experiments with the super-high frequencies.

Science News Letter, February 16, 1946

ASTRONOMY

New Star Visible In Northern Heavens

➤ LOOK IN THE northern heavens to see a new exploding star that burst forth early on the morning of Feb. 9. The famous nova of 1866, T Coronae Borsalis was in intervening years a tenth magnitude star, far below naked eye visibility Suddenly it increased in brightness many hundred times, reaching a magnitude of three and two-tenths, Dr Armin Deutsch of Yerkes Observatory, discovered

The discovery, reported by Dr Otto Struve of Yerkes Observatory, showed that this star, a faint member of the constellation of the northern crown, had again become a nova Study of the star's spectrum betrayed that it was expanding at the rate of 2500 miles (4000 kilometers) a second

Astronomers will follow the star closely to discover why stars not only suddenly increase in brightness, but do so more than once There are several other recurrent novae on record, including T Pyxidis, which burst forth for the fourth time in 1943.

Science News Letter, February 16, 1946

MEDICINE

A-Bomb Tracer Chemicals Used in Medical Research

➤ ATOMIC "TRACER" research indicates that carbon monoxide cannot be utilized by the human body in combination with oxygen to form carbon dioxide

The research, performed by the University of California Aero-Medical Unit and recently removed from the war secrets list, was done with radioactive carbon monoxide produced in the 60-inch Berkeley cyclotron.

Purpose of the experiments was to determine whether the safe level of carbon monoxide in airplane cockpits, tanks, etc, could be changed in favor of higher tolerance. The research did not indicate this could be done

Human subjects were allowed to breathe radioactive carbon monoxide followed by 100% oxygen A bag containing soda lime was then placed over their mouths. In the event carbon monoxide was combined with oxygen to form carbon dioxide, the radio carbon in the latter would be collected from the breath in the lime.

Only a negligible quantity of radio carbon was collected, so little in fact that it indicated no carbon monoxide was utilized in the formation of carbon dioxide

Short-lived radioactive carbon, known as Carbon 11, was used in the experiments This isotope of carbon has a half-life of only 21 minutes, allowing experimenters only a few hours to work with it

The researchers are withholding final judgment on the formation of carbon dioxide until experiments can be done with long-lived radioactive carbon, known as Carbon 14 With this isotope, long and complicated experiments can be done

The research was done by Dr. John Lawrence, who was head of the Aero-Medical Unit and who has returned to peacetime research as head of the biological research program in the Berkeley radiation laboratory, and Dr. Cornelius Tobias, a member of the laboratory staff Dr Joseph G Hamilton, of the radiation laboratory, prepared the radio carbon monoxide The work was done under an OSRD contract

Science News Letter, February 16, 1946

PHYSICS

Submerged Submarines To Have Communication

➤ SUBMARINES of the future may receive orders from distant land bases and sent reports of their operations while submerged, says D. W R McKinley, a Canadian physicist of the Radio Branch, National Research Laboratories (*Canadian Journal of Research*)

Mr McKinley reports investigations that show transmitting stations radiating many thousands of watts of power should be able to send signals to submerged craft many hundreds of miles away He adds that the undersea craft should be able to send back signals from below the surface of the water.

The Canadian investigator declares that the use of electromagnetic radiation by airplanes as a sort of "underwater radar" for locating submerged submarines is not practical. But he finds that a land station, such as that at Rugby, England, radiating 500,000 watts, should be able to send signals that could be detected by a submarine 1,000 miles at sea.

Development of communications with undersea craft, combined with discoveries permitting submarines to remain underwater for longer periods, may make possible huge undersea fleets operating in conjunction with surface ships.

Science News Letter, February 16, 1946

IN SCIEN

CHEMISTRY

TB Germs Killed By Mold Products

➤ TUBERCULOSIS germs from patients in far advanced stages of the disease have been killed by a chemical extracted from mold, Dr Isadore E Gerber and Milton Gross, of the Hudson County N J, Tuberculosis Hospital report (*Science*, Feb 8)

The mold substance is called mycocidin It was obtained from a mold belonging to a group of *Aspergillaceae* Whether it will ever become a remedy for tuberculosis is not indicated in the scientific report.

Growth of the disease-causing TB germs in glass tubes was completely checked by mycocidin. Germs that had been exposed to mycocidin in these tubes were injected into guinea pigs in amounts that ordinarily would cause fatal tuberculosis in the animals The animals remained well and at death showed no signs of tuberculosis

The activity of mycocidin against other kinds of disease germs is being tested and efforts are being made to obtain it in pure form

Science News Letter, February 16, 1946

CHEMISTRY

Vitaly Khlopin Receives 200,000 Ruble Award

➤ THE FIRST CLASS Stalin award of 200,000 rubles has been made to Vitaly Khlopin, member of the USSR Academy of Science and director of its radium institute, in recognition of his contributions to the science of radioactivity Dr Khlopin is internationally known for his research work in the chemistry of radioactive substances and in the use of radioactive preparations as applied in the medical field

The Radium Institute of the USSR Academy of Science is now one of the world's most progressive institutions in which radioactive phenomena are studied. Its work under Academician Khlopin has greatly influenced the development of the radium industry in the Soviet Union, which uses home-produced raw material.

Science News Letter, February 16, 1946

E FIELDS

ZOOLOGY

Dozen Dwarf Chameleons At Zoo in Washington

See Front Cover

➤ A DOZEN DWARF chameleons from North Africa, guaranteed to keep up with any color changes except those of a Congressman's mind in election year, have been received at the National Zoological Park in Washington, D C They are among the rarest of lizards, and have never before been represented in the collections at this zoo Among their other peculiarities is the fact that they bring forth their young alive instead of laying eggs—a rather unusual thing among lizards One of the lizards is shown in the photograph by Fremont Davis, Science Service staff photographer, on the front cover of this SCIENCE NEWS LETTER

Along with the North African specimens came some from South Africa—half-a-dozen spiny-tailed lizards

From West Africa came a gift of half-a-dozen assorted specimens of the world's deadliest serpents two African cobras, two rhinoceros vipers and two Gaboon vipers With these were two burrowing pythons, which are non-poisonous constrictor snakes, and one broad-nosed crocodile All these were collected and sent to Director William M. Mann by Forest Officer G S Cansdale, of the Gold Coast

The two pythons are in a way the most interesting specimens in the lot, Dr Mann stated They do not have tapering tails like most snakes, so that they are sometimes called stump-tailed pythons So blunt are their tails that it is not easy to tell at a glance which end of the snake the head is on

Science News Letter, February 16, 1946

AERONAUTICS-CARTOGRAPHY

Aeronautical Maps Will Be Of the American Type

➤ NEW AERONAUTICAL maps of much of the world will be of the American type, using the same symbols and color markings, the Civil Aeronautics Administration has announced It was decided also at an international meeting in Montreal, CAA says, to base the World Aeronautical Charts on the standard American one-to-a-million-scale military aviation chart

The use of these familiar symbols and color markings will be helpful to American pilots flying abroad. Flyers of many Allied countries have used or are familiar with American type aeronautical maps This fact makes their worldwide adoption logical

Some changes will be necessary, Kenneth Keefe of CAA states, to meet special conditions found outside the United States, and were agreed upon at the international meeting For example, he said, forest areas in England and much of Europe are sharply defined and permanent Therefore the meeting recommended use of green to show these wooded areas on European charts, whereas green will continue to symbolize land areas close to sea level on most charts of this hemisphere.

Towns marked with their names on roofs or other conspicuous spots will have their names underlined, Mr Keefe explained, with magenta on the world air maps Markers outside of town limits will be indicated by an "M" in a square

Science News Letter, February 16, 1946

ZOOLOGY

Small Sand Crabs Devour Stranded Jellyfish

➤ SMALL SAND CRABS that live in millions in the beaches of Hawaii help keep the shoreline tidied up by devouring the dead bodies of stranded Portuguese men-of-war, which are a peculiar type of jellyfish that drift in countless numbers on the ocean surface in the warmer parts of the world Dr. David D Bonnet of the University of Hawaii tells of this peculiar feeding habit of the sand crabs in *Science* (Feb 1)

He discovered it in the course of an investigation of the Portuguese men-of-war, which are nuisances to bathers because of the painful stings they inflict on contacting living flesh. Their stranded bodies seemed to be much less numerous than should have been expected. On seeking the cause for this disappearance, he found it was due to the sand crabs These small crustaceans automatically provide burial for the jellyfish, because they habitually remain buried in the sand themselves, with only their tiny eyes showing, and they feed on the Portuguese men-of-war, which seem to constitute their only food, by "eating up at them" from underneath.

Science News Letter, February 16, 1946

ASTRONOMY

Faint Comet Discovered At Vatican Observatory

➤ A NINTH MAGNITUDE comet was discovered in the constellation of Ursa Major, the great bear, on Feb 2 by M Timmers of the Vatican Observatory The newly discovered comet may be seen throughout the next few months by those who search for it with a small telescope

The comet is not expected, however, to become brighter than the eighth magnitude Although it will be nearest the sun about April 18, it is at present as close to the earth as it will ever get.

On Feb 21 the comet is expected to have a right ascension of 9 hours 1 minute, and a declination of 61 degrees 49 minutes This position was calculated by Dr Leland E. Cunningham of Aberdeen, Md , who received reports of observations of the comet from Yerkes Observatory of the University of Chicago, Lick Observatory of the University of California, and Lowell Observatory at Flagstaff, Ariz

On March 1 the comet's right ascension is predicted to be 8 hours 30 3 minutes and its declination 67 degrees 37 minutes Around May 10, when it will be in the vicinity of the North Star, the comet will have probably faded to eleventh magnitude

Science News Letter, February 16, 1946

CHEMISTRY

Durable Glazes on Chintz Developed with Resins

➤ DURABLE GLAZES on chintz, cotton fabric printed with colored designs, can be obtained through the use of relatively new resins developed by the American Cyanamid Company's textile resin division. Chintzes treated with the resin can be washed without loss of glaze, and also without noticeable shrinkage because the new finish greatly limits shrinking

The resins are melamine formaldehyde compounds Through their use it is now possible to obtain high-gloss glazes that will withstand boiling for a half hour in soapy water, it is claimed, and which are also immune to dry cleaning processes Another important effect of the treatment with melamine resin is to limit the shrinkage to less than 2% in length or width Melamine resin treatments are used also for controlling the shrinkage of wool fabrics.

Science News Letter, February 16, 1946

ENGINEERING

Engines of the Future

Turbine, rocket motors developed during the war for fighting planes will power transports of tomorrow and give America the speed it craves.

By A. C. MONAHAN

➤ NEW ENGINES developed for fighting planes during the war will power transports of tomorrow and give air-minded America the speed it craves They include the gas-turbine, father of the jets — turbojet, motorjet, ramjet, pulsejet, turboprop and turbotan—and several types of rocket motors

Speed means high-altitude flying, even at heights way above the atmosphere surrounding the earth Ordinary jet planes operate only in the oxygen-bearing air Rocket motors can operate above the air because they carry their own oxygen for fuel needs

Low-altitude aircraft in the future may use gas-turbines operating propellers, or they may continue to use the conventional reciprocating engine with its pistons pumping forward and back inside explosion chambers called cylinders Some planes may be equipped with propellers for low flying and jet propulsion for high altitudes In fact one installation, the propjet, has already been built and tested that operates propellers when desired and gives jet propulsion at will.

The gas-turbine is not a jet-propulsion engine but from it the jet engine of today was developed It rotates a shaft which turns ordinary giant fan-like propellers just as does the reciprocating engine But all moving parts in it move constantly in the same direction, thus eliminating vibration Also it is a light and powerful unit

Similar to Steam Turbine

Gas-turbines are somewhat similar to the well-known and long-used steam turbines in which high-pressure steam escapes through many fan-like blades or vanes mounted on a drum causing them and the drum to rotate at high speed.

In the steam turbine, fuel is burned to generate the steam In the gas-turbine, fuel oil is burned at nozzles, making a rapidly expanded gas that passes directly through the hundreds of vanes on the turbine, imparting to the drive shaft a rapid and powerful rotation

The principle of the gas-turbine has been known for years, but the development of a successful engine of this type had to await the development of alloy metals that would stand up while operating red hot Gas-turbines reach their greatest efficiency only at extreme heat Alloy metals to stand this heat were found in developing turbo-superchargers to supply conventional engines with sufficient atmospheric oxygen at high altitudes

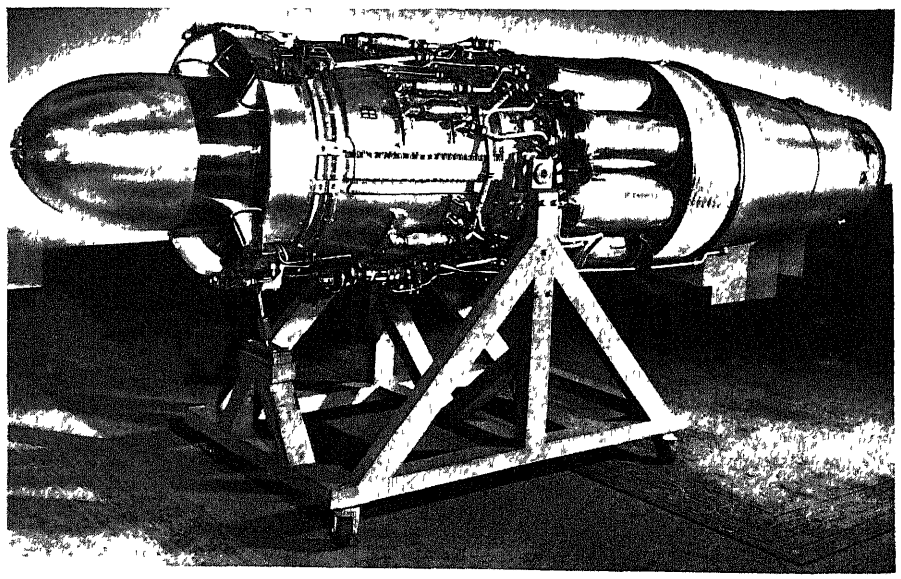
The principle behind jet propulsion is easily understood First, it is *not* the result of a blast of hot gas pushing against a cushion of air behind the plane, as is commonly supposed. It is the result of a rapidly created gas, seeking room to expand, pushing against the forward end of the combustion chamber in which it is created If it depended upon pushing against air behind it, jet propulsion would be inefficient in thin air and rockets could not travel above the atmosphere.

Imagine a cylinder with very strong walls through which a spark plug is inserted, as in an automobile, and within which atomized gasoline and air are confined By means of the spark plug, and an electric spark, the gasoline is exploded That means that it is almost instantaneously burned, uniting chemically with the oxygen in the enclosed air and forming a gas that normally requires much more space than there is within the cylinder The newly-formed gas remains under a heavy compression and would burst the cylinder if it was not very strong It exerts a heavy but equal pressure on every square inch of its confining walls

Now suppose the cylinder has a small opening at one end, and the sudden pressure is created At the hole there is no wall for the gas to press against, so instead of equal pressures on the two ends, one has a pressure approaching zero The pressure on the other end tends to force the cylinder to move in its direction

"Jet propulsion is in its infancy despite the fact that this war has evolved six distinct methods of utilizing atmospheric oxygen for propulsion," says Gen H H Arnold in his recent report as commander of the Army Air Force The names of the six are included in the list given above

The motorjet is a reciprocating engine plus a ducted fan The turboprop is a



FOR SPEED—Streamlined like a torpedo, this new engine for jet propulsion, developed by General Electric, will speed planes well in excess of 500 miles an hour.

gas-turbine plus propellers The turbofan is a gas-turbine plus a ducted fan The turbojet is a gas-turbine plus jet The ramjet gives a continuous jet with compression by an aerodynamic ram, and the pulsejet is an intermittent jet

The pure jet-propusion engine utilizes no whirling propellers It is the engine of the new Army plane, the P-80 Shooting Star, built by Lockheed The engine is a product of General Electric, and is said to be the simplest, most easily maintained, and one of the most powerful aircraft engines ever built

The Shooting Star can operate only within the atmosphere as air is required for its engine The air enters near the front and is compressed by a high-velocity blower which forces it into the combustion chamber There it mixes with the kerosene fuel, which is injected at high pressure, and combustion takes place The mixture is burned in a continuous explosion heating the gases and expanding them violently

These gases rush to the rear and escape through jet nozzles, passing en route through the vanes of a gas-turbine wheel imparting high velocity to it The turbine operates the compressor blower for the compression of the incoming air.

Simple Ignition System

There is no complicated ignition system in the engine A spark plug sets off the initial explosion, but once the engine is started a small glow plug becomes white hot and continuously ignites the fuel and air mixture

Streamlined like torpedoes, the newest of turbojet engines, designed for speedy long-range flights, will fit more snugly into the wings of a plane than any powerful reciprocating engine They are the axial flow type, with their principal units in a direct line

In operation, air rams into the relatively small diameter axial flow compressor, and, after compression, is forced almost in a direct line back into combustion chambers. The gases resulting from combustion are expanded through the buckets of a turbine, then pass out through the jet exhaust to furnish the reaction to drive the plane

Rocket motors can operate above the atmosphere because they carry their own oxygen and are independent of a supply from the air. They carry it, not as compressed oxygen in tanks, but in oxygen-yielding chemical compounds, known technically as oxidizers, mixed with the fuel. The mixture burns with sufficient rapidity to give high velocity to the escaping gas In some cases the fuel and oxidizer are mixed before use and are made in the form of "grains" A grain is an extruded stick, made from a paste-like mixture and may be several feet in length Grains must be free of flaws or air pockets to insure an even rate of combustion In plants where they are made they are examined by X-ray equipment to make certain that they are flawless

Powered Robot Bombs

The jet-reaction engine known as the liquid-propellant rocket motor is the type that powered German V-2 robot bombs in the last days of the European war It utilizes a liquid fuel injected as used into a combustion chamber, and for this reason, its operation cannot be compared with the powder- or solid-propellant rocket motor whose entire charge of fuel is lodged in the combustion chamber

The liquid-propellant rocket motor can be repeatedly operated for long periods of time by merely replenishing the fuel and oxygen-carrying compound. Basically it consists of an injector somewhat similar to the carburetor in an automobile reciprocating engine, a combustion chamber, nozzle and a cooling jacket The injector is made up of two chambers, one to feed the oxygen-carrying compound, the other to feed the fuel which may be any hydrocarbon

A new experimental engine, claimed to be the smallest engine in the world today, was demonstrated recently in America by its inventor, a Polish scientist and rocket expert. It is a ramjet motor of a new and unusual design It was designed to help launch gliders into the air

This new engine consists of a cylindrical tube, which appears to be just a pipe, mounted on a restraining structure which has a free moving arm to permit the engine to swing in a circle around it when in operation

The tube has a lining, a topless cone in shape, which opens from a smaller diameter in the front end to a larger diameter at the other The space between the lining and the outer wall contains the gas which runs into a nozzle at the forward end of the cylinder Air mixes with the gas coming through the small holes of the nozzle and combustion then takes place, thus providing the force of propulsion.

Gas-turbine engines driving propellers will replace conventional reciprocating airplane engines in all planes designed to travel at speeds under 500 miles an hour and at altitudes less than some 30,000 feet, predicted Hall H Hibbard of the Lockheed Aircraft Company recently

For higher speeds, he said, speeds of from 500 to 1500 miles an hour, pure jet engines without propellers will be used With rocket engines, fighters and bombers of future years will be able to fly above the earth's atmosphere at practically any speed desired

Science News Letter, February 16, 1946

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Allspice, technically pimento in Jamaica from which it comes, got its name because it has a flavor similar to a mixture of cinnamon, cloves and nutmeg

If you want to keep *fishworms* in captivity put them in a wash-tub filled with a half-and-half mixture of rich earth and dried coffee grounds, a pound each of vegetable shortening and corn meal will feed 5,000 for a month

Fossils of 28 different kinds of previously unknown animals recently unearthed in Colombia, now at the University of California, include an animal which had habits like a wolf but which was a marsupial, the family of the kangaroo and opossum.



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ELECTRONICS

Improved Radar

New especially designed ground-based and airborne equipment and land-based long-range radiobeacons proposed to make commercial flying safer.

➤ IMPROVED ground-based and airborne radar equipment, especially designed for the purpose, and a network of land-based long-range radio-beacons were proposed as means of making commercial flying safer by Henry Busignies of the International Telephone and Telegraph Corporation He described what he termed a radical new system of airport traffic control and navigation along airways, called "Navar," and a proposed worldwide system of long-range radiobeacons called "Navaglobe" for short

The proposal was made at the week-long Army-sponsored conference in Washington, D C, attended by military and civilian aviation experts, at which technical systems of making all-weather flying safer are being discussed

The navar system, he stated, would project an electronic "moving picture" on a chart in the airport control center, showing the location and identity of every plane in the sky within 80 miles of the airport

Navar, developed by Mr. Busignies, is, he said, an application of most of the types of radar proved during the war In addition to the constantly moving radar picture in the ground-based control room, the pilot of a navar-equipped plane will see on his own radar scope his own and all other aircraft near his position and altitude, in relation to each other and to the ground, in one map-like indication, he stated

The ground radar installation will show the planes in the area on three scopes, Mr Busignies explained, each scope covering a certain category of aircraft. "Member" planes, he said, are those equipped with navar and tuned to the local control station, "guests" are planes whose navar sets are tuned to another station; and "strangers" are aircraft without navar At the ground navar station the images of all planes in all three scopes are transmitted through a specially designed projector onto a large map of the area on a wall screen

In addition to the lateral positions of planes in the area, he continued, the figures on the map representing member planes will show adjacent groups of letters and numbers identifying each plane and telling its altitude The equipment permitting this feature is based on the IFF (identification—friend or foe) automatic radar method used by aircraft during the war This IFF equipment answers automatically certain "stock" questions about flying conditions without attention of the crew

The complete coordinated picture of all aerial activity in the control area is retransmitted by the ground station and picked up by the navar-equipped planes, he further explained The airborne radar scope is viewed through a translucent map of the control area so that the pilot sees his own and other planes in relation to the ground as well as to each other

Science News Letter, February 16, 1946

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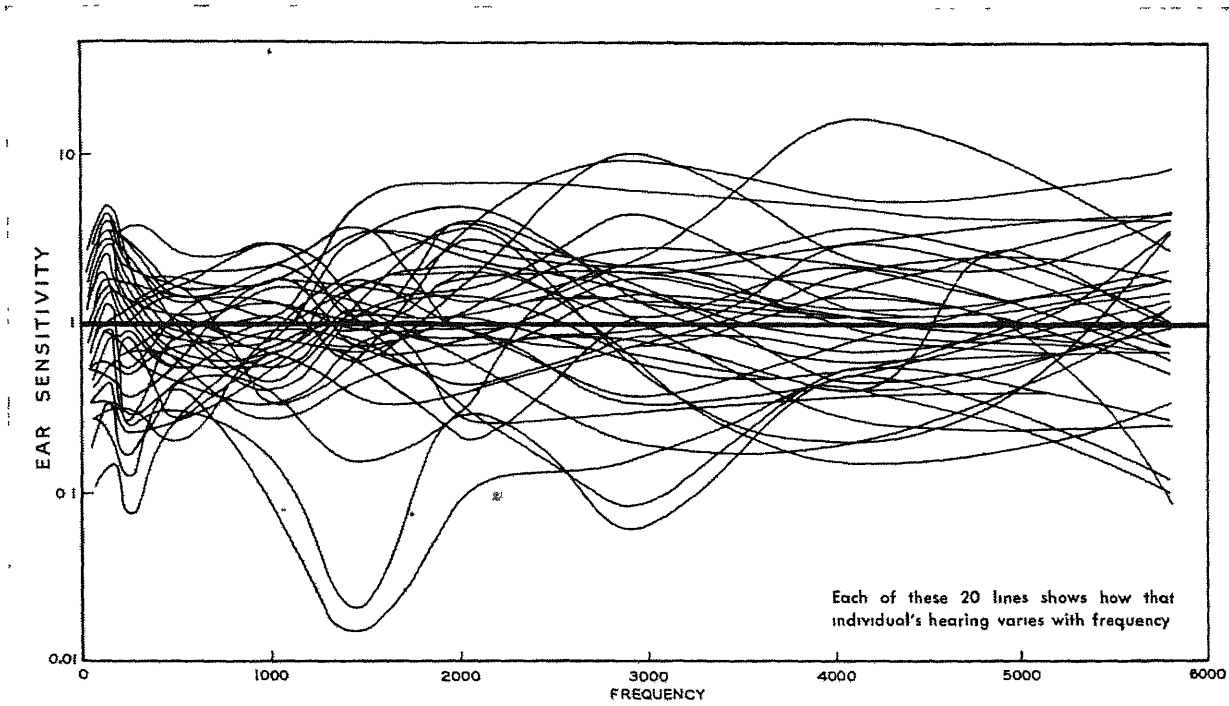
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To measure is to know

Twenty-five years ago, one standard of sound power was the ticking of a watch, another was the clicking of two coins, and the measure was how far away the tick or the click could be heard. That test was made in measuring people's hearing, a field of interest to the Bell System scientists because the ear is the end-point of every talking circuit

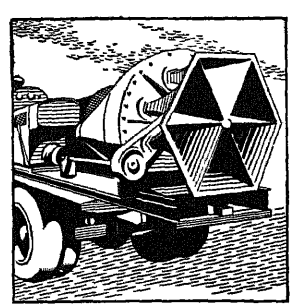
Accustomed to exact measurements, Bell scientists proceeded to develop a method of measuring hearing-sensitivity in terms which could be precisely defined and reproduced After plotting hundreds of runs like those above, they decided on a particular sound intensity, representing an average "threshold of hearing," as a starting point

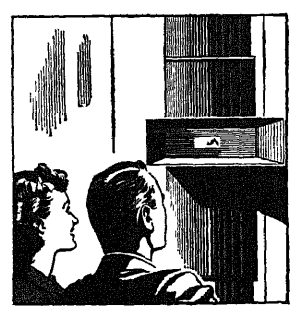
The sounds delivered by a telephone line had previously been evaluated by listeners who compared their loudness with that of a standard source There were wide variations in ears, as the chart shows, so the engineers replaced them by electrical instruments When later their associates developed the Western Electric radio and public address systems, the necessary measuring circuits were promptly forthcoming Addition of a standard microphone made a noise meter, widely used in quieting airplanes and automobiles

"Through measurement to knowledge," said a famous Netherlands scientist The principle finds wide application in Bell Laboratories, whether the quest be for a way to measure sound, a new kind of insulation, or more economical telephone service


Hearing was first measured reliably by engineers in the Bell Telephone Laboratories


For good reception, program loudness must stay within certain limits Volume-meters help to hold it there


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• Books of the Week •

ALL AROUND US—Wilbur L Beauchamp, Gertrude Crampton, William S Gray—*Scott*, 80 p, illus, $1 08 For use in Grade Two, presents the fundamental concepts of natural science through pictures Teachers' edition contains many suggestions

THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC. for the year 1947—U S Naval Observatory—*Government Printing Office*, 630 p, $2

ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION 1944—*Government Printing Office*, 503 p, charts, illus, $1 50 Operations and expenditures of the Institution and papers on astronomy, industrial sciences, medicine, etc

A BIBLIOGRAPHY AND SHORT BIOGRAPHICAL SKETCH OF WILLIAM HEALY DALL—Paul Bartsch, Harald Alfred Rehder, Beulah E Shields—*Smithsonian Institution*, 96 p, plate, 45 cents Smithsonian Miscellaneous Collections, Vol 104, No 15

BIRDS OF THE WHITE-FULLER EXPEDITION TO KENYA, EAST AFRICA—Harry C. Oberholser—*Cleveland Museum of Natural History*, 122 p, illus, $1 Scientific Publications of the Cleveland Museum of Natural History, Vol IV, No 3

THE BIRTH AND DEATH OF THE SUN—George Gamow—*Penguin*, 219 p, diagrs and illus, 25 cents The intricacies of physics and atomic energy handled with simplicity and clarity, this edition contains a new preface and a special appendix on the atomic bomb.

THE CHALLENGE OF RED CHINA—Gunther Stein—*McGraw*, 490 p, illus, $3 50 An analysis of the aims, problems and achievements of the Communists in China and of the attempts of the U. S to coordinate relations between the two Chinas

CLINICAL ELECTROCARDIOGRAPHY — David Scherf and Linn J Boyd—*Lippincott*, 267 p, illus, $8 2nd ed In this revised edition the essential features of electrocardiography are presented for the reader unacquainted with the field

DEMOCRATIC EDUCATION — Benjamin Fine —*Crowell*, 251 p, $2 50 A report on the fundamental controversy between "aristocratic" education based on the classics, and "democratic" education dealing with contemporary problems, and a plea that colleges teach students to meet practical social problems

DICTIONARY OF FOREIGN TRADE—Frank Henius—*Prentice-Hall*, 745 p, illus, $10 Concise definitions of foreign trade terms and a detailed explanation of foreign trade practises and procedures.

THE DINOSAUR BOOK The Ruling Reptiles and Their Relatives—Edwin H Colbert—*American Museum of Natural History*, 156 p, illus, $2 50 A popular book on the fossil amphibians and reptiles, with particular attention given to the dinosaurs

THE GOVERNING BOARD OF THE HOSPITAL —*American Hospital Assn*, 29 p, 20 cents Discussion of the term of office, organization, responsibilities and training of the governing body of the hospital

HIGH VACUUM FOR INDUSTRY—*National Research Corp*, 24 p, charts and illus, free The methods and accomplishments of Vacuum Engineering Division of National Research Corp in making high vacuum apparatus available for commercial application

HOW DO WE KNOW?—Wilbur L Beauchamp, Gertrude Crampton, William S Gray—*Scott*, 96 p, illus, $1 24 For use in Grade Three in a picture-method primary science program which includes the study of animals, land and water, plants, wheels and levers Teachers' edition contains many suggestions

INSECT DIETARY An Account of the Food Habits of Insects—Charles T Brues—*Harvard Univ Press*, 466 p, illus, $5 The diverse relations of insects to their environment through the medium of their food, the devious ways in which they have exploited the living world in their search for food, and how these activities have guided their evolution

LONGLEAF PINE—W G Wahlenberg—*Charles Lathrop Pack Forestry Foundation*, 429 p, charts and illus, $5 The use, ecology, regeneration, protection, growth, and management of longleaf pine

MANUAL OF HOT-MIX ASPHALTIC CONCRETE—*Asphalt Institute*, 111 p, charts and diagrs, free Recommended thickness requirements, methods of testing mixtures, and inspection

MEASURING THE COMMUNITY FOR A HOSPITAL—*American Hospital Assn*, 39 p, 25 cents. How to estimate the size of hospital required, and how to plan the building and organization

MEET THE U S A Handbook for Foreign Students in the United States—Ching-Kun Yang—*Institute of International Education*, 184 p, illus, 50 cents Descriptions of the political, economic, social, cultural and industrial phases of American life and detailed information about American colleges and universities

MEMORANDUM ON THE POSTWAR INTERNATIONAL INFORMATION PROGRAM OF THE UNITED STATES—Dr Arthur W Macmahon—*Department of State*, 135 p, 30 cents

NEW WESTVILLE, PREBLE COUNTY, OHIO, METEORITE—E P Henderson and S H Perry—*Smithsonian Institution*, 9 p, plates, 15 cents Smithsonian Miscellaneous Collections, Vol 104, No 17

ORGANIZATION OF THE MEDICAL STAFF OF THE HOSPITAL—*American Hospital Assn*, 46 p, 20 cents Discussions of the active staff, the visiting staff, or those who are privileged to use the professional facilities of the hospital, and the consulting staff

PATTERNS OF CULTURE—Ruth Benedict—*Pelican*, 272 p, 25 cents By showing that human cultures represent a whole range of integrated patterns of behavior that shape our actions, the author sweeps aside a mass of prejudices and puts in a new light the dilemma of the individual and society

THE PEOPLES OF THE SOVIET UNION—Corliss Lamont—*Harcourt*, 229 p, illus and maps, $3 A description of the nations that make up the Soviet Union, and an explanation of the way in which racial and cultural democracy has been achieved in the U S S R

REPORT OF THE COMMITTEE ON MARINE ECOLOGY AS RELATED TO PALEONTOLOGY 1944-1945 — *National Research Council*, 56 p, diagrs, 50 cents Activities of the committee and papers in specialized fields

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TWENTIETH CENTURY PSYCHOLOGY—Philip Lawrence Harriman, Ed—*Philosophical Library*, 712 p, charts, $6 Representative essays from the fields of psychological theory, social psychology, animal behavior, abnormal phenomena, and reports of research inquiries

UNWRITTEN TREATY—James P Warburg—*Harcourt*, 186 p, $2. A concrete proposal for the elimination of psychological warfare and for the organization of world-wide freedom of information, an analysis of the Axis propaganda techniques and of the Allied psychological counterattack

YOU AND THE UNIVERSE—John J O'Neill—*Ives Washburn*, 328 p., $3 50 The current developments in every field of science from astronomy to zoology, a panoramic view of ourselves and our changing environment as revealed in the light of science today

Science News Letter, February 16 1946

Molecules in natural gasoline are like strings of beads, while those in aviation gasoline suggest bunches of grapes

Studies with the *ultramicroscope* reveal that filtrable viruses are crystallizable proteins

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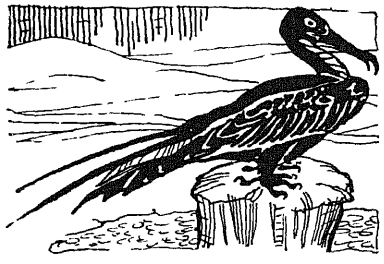
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ECOLOGY

NATURE RAMBLINGS by Frank Thone



Winds of Hunger

➤ DISASTER MENACES the millions of cormorants, gulls, pelicans and boobies that are the living foundation of Peru's guano industry, on a group of rocky, arid islands off the coast, declares William Vogt, chief of the Pan American Union's conservation section

Guano is formed in great quantities on the nesting grounds of these fish-eating sea birds Every day they fly out to sea to feed, and to bring supplies home to their young The radius of their feeding flights is limited by their flying speed and the number of daylight hours

Normally there are plenty of fish, mainly anchovies, within this radius, for the cold, food-rich Humboldt current hugs the shore closely About one year in seven, however, long-period changes in the prevailing winds cause this current to shift farther out to sea, taking the swarming fish-life with it The parent birds, to insure their own survival, have to shift with it, and this means leaving the young to starve. This brings about a failure of the guano crop, which in turn causes hardship in the guano-dependent Peruvian agricultural economy.

This is the seventh year since the last seaward shift of the fish that are the raw material for guano, and already signs of trouble are appearing. On some of the islands, bird flocks are reported starting a second nesting period This Mr Vogt interprets as meaning that the fishing has turned bad off some of the other islands, and that the birds have deserted their nests there and are trying again on islands nearer to the shifted fishing waters

Science News Letter, February 16, 1946

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By HUGH STOTT TAYLOR, ERNEST O. LAWRENCE, and IRVING LANGMUIR

With an introduction by J R DUNNING, in charge of the Atomic Energy Project at Columbia University

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Science News Letter, February 16, 1946

⚙ *PHOTOCOPIES of drawings or manuscripts can be made in a normally lighted room in a new rotary printer which uses green fluorescent tubes A special paper on which the copies are made is photographically sensitive to green light, but only slightly so to ordinary electric light*

Science News Letter, February 16, 1946

⚙ *HANDY HOLDER for hacksaw blades has a tubular handle with an extended grip nose for securing the working point of the blade The ends of the handle are slotted to receive the inserted blade, and any length blade can be used*

Science News Letter, February 16, 1946

⚙ *STEEL STRAPPING made of a special alloy holds together boxes used to drop fragile cargo from airplanes without the use of parachutes The elastic steel absorbs the shock without breaking. The box, three feet long and one foot square, has a laminated snub nose at each end Contents are packed in ground paper*

Science News Letter, February 16, 1946



⚙ *LOUDSPEAKER, powerful enough to pierce the thunder of battle, has nine receivers and horns mounted on a common panel pivoted on a tripod so that it can be turned up or down, to right or left. Horns, tripod and operator are shown in the picture*

Science News Letter, February 16, 1946

⚙ *COFFEE FLOAT, a wire-mesh tube to hold coffee grounds near the surface of the water in the pot, has two air chambers at its ends to furnish buoyancy The bubbling boiling water agitates the float and its contents, so that the coffee grounds are in constant contact with changing water*

Science News Letter, February 16, 1946

⚙ *RAZOR BLADE sharpener, to whet the cutting edge of seven [illegible] blades at one time, is a [illegible] jar with nearly vertical sides and a removable cylinder fitted inside on whose outer surface the blades are attached The cylinder holding the blades is rotated by a knob projecting from its top*

Science News Letter, February 16, 1946

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Question Box

AERONAUTICS-CARTOGRAPHY

Of what type will the new aeronautical maps be? p 105

AERONAUTICS-METEOROLOGY

What will make all-weather flying a reality? p 99

ASTRONOMY

What caused the recent blackout of short-wave reception? p. 99

What new comet has been discovered? p 105

What new star is visible in the northern sky? p 104

CHEMISTRY

How will molecules make possible great advances in medicine and biology? p. 102

What may make it easier to study the human brain? p 102

What new TB weapon is offered? p. 104

ELECTRONICS

How may radar be improved to make commercial flying safer? p 108

NUTRITION

What problems will result from changing our basic flour to help feed Europe? p 101.

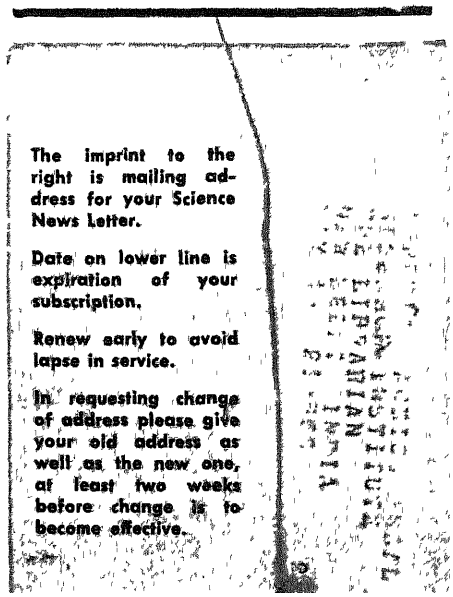
MEDICINE

How have mouse studies aided in polio research? p 100

PHYSICS

How will it be possible to communicate with submerged submarines? p 104.

Where published sources are used they are cited



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25 Oct 1948

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Charles Sawyer, Secretary
NATIONAL BUREAU OF STANDARDS
E U Condon, Director

AUGUST 1948
VOLUME • 41
NUMBER 2

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of the

NATIONAL BUREAU OF STANDARDS

Contents

RP		Page
1906	Strain test for evaluation of rubber compounds Frank L. Roth and Robert D. Stiehler. (Price 10 cents)	87
1907	Strain tester for rubber. William L. Holt, Ellis O. Knox, and Frank L. Roth. (Price 10 cents)	95
1908	Barium aluminate hydrates. Elmer T. Carlson and Lansing S. Wells (Price 10 cents)	103
1909	Aliphatic halide-carbonyl condensations by means of sodium Edgar A. Cadwallader, Abraham Fookson, Thomas W. Mears, and Frank L Howard. (Price 10 cents)	111
1910	Barium 2-ketolactobionate and the corresponding barium bromide double salt. William W. Walton and Horace S Isbell. (Price 10 cents)	119
1911	Infrared prism spectrometry from 24 to 40 microns. Earle K. Plyler (Price 10 cents)	125
1912	Mass spectra of octanes. Evelyn G. Bloom, Fred L Mohler, J. H. Lengel, and C. Edward Wise. (Price 10 cents)	129
1913	Effects of substitute fuels on automotive engines. Clarence S Bruce, Jesse T. Duck, and A. R. Pierce. (Price 10 cents)	135
1914	Applications of magnetochemistry to polymers and polymerization. Pierce W. Selwood. (Price 10 cents)	151

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SCIENCE NEWS LETTER

Vol. 49, No. 8

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 23, 1946



Adds Quickly

See Page 118

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946



Radio relay towers, about 50 miles apart, will gradually replace thousands of miles of telegraph poles and wires

Now, telegrams "leapfrog" storms through RCA Radio Relay

With the radio relay system, developed by RCA, Western Union will be able to send telegraph messages between principal cities without poles and wires

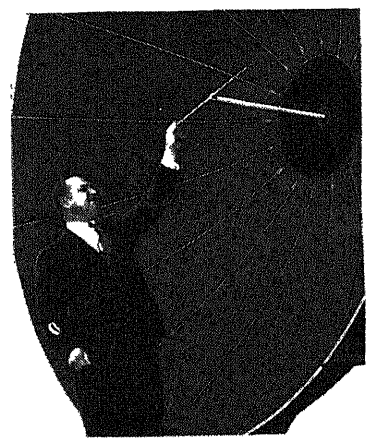
"Wires down due to storm" will no longer disrupt communications For this new system can transmit telegrams and radiophotos by invisible electric microwaves These beams span distances up to fifty miles between towers and are completely unaffected by even the angriest storms

When large numbers of communications circuits are required, these automatic radio relay systems are more efficient than the pole and wire system . . are less costly to build and maintain. They'll be particularly useful, too, in areas such as China and South America where distances are great and long-line services have not been developed

This revolutionary stride in communications was made possible by research in RCA Laboratories—the same "make it better" research that goes into *all* RCA products.

And when you buy an RCA Victor radio or television set or a Victrola* radiophonograph, you enjoy a unique pride of ownership For you know, if it's an RCA it is one of the finest instruments of its kind that science has achieved

Radio Corporation of America, RCA Building, Radio City, New York 20, N Y . Listen to The RCA Victor Show, Sundays, 4 30 P M , Eastern Time, over the NBC Network



Research in microwaves and electron tubes at RCA Laboratories led to the development by the RCA Victor Division of this automatic radio relay system Here is a close-up view of a microwave reflector This system holds great promise of linking television stations into networks, as well as relaying other forms of electric communications

RCA **RADIO CORPORATION of AMERICA**

*Victrola, T M. Reg. U. S. Pat. Off.

AERONAUTICS

"Push-Button" Flying

First fully automatic flight control device is being tested by Air Technical Service Command. Has been installed on C-54 "Skymaster."

➤ THE FIRST FULLY automatic flight control device is now being tested by the Air Technical Service Command's All-Weather Flying Center, Columbus, Ohio

"Push-button" flying is promised by the new instrument which will take off, fly and land an airplane by merely pushing buttons before the take-off to direct its flight The flight controller, used in conjunction with the A-12 automatic pilot, has been installed in a giant Douglas C-54 "Skymaster" transport for first tests in actual operation

The new development isn't a radio-controlled plane, but actually an automatic one which permits pre-selection of the course and destination When the buttons are pushed, according to the ATSC flying experts, the plane will take off, fly a predetermined course to the place indicated by the original button pushed, and land itself automatically

Designed to permit flights in all weather conditions, the new flight controller is declared to be "the most significant development in flight engineering" by ATSC officials

Nerve center of the automatic flight controller is the master sequence selector, a huge automatic calculating machine that registers such variable factors as direction, distance and altitude and adjusts the flight of the ship to keep it on its course

Placed on a runway, the plane using the flight controller can be sent on its way by a button push from the flight dispatcher, it is claimed The plane's throttle moves up automatically to initiate the take-off The brakes are unlocked after eight seconds and the plane is on its way

At 800 feet, the pressure-stat operates to move back the throttle, the wheels are retracted and the aircraft climbs to its cruise altitude The throttle is moved to cruising speed by the pressure-stat, the magnetic heading control adjusts the plane's course, and the air log records the distance covered in air miles

As the plane reaches its destination, the air log signals approach to the airport. In landing, ATSC says, the automatically controlled plane comes down to the selected radio compass station It passes over a cone-of-silence marker that cuts the throttle, while the automatic pilot is being controlled by a compass locator station at the port's outer marker A down signal fed into the elevator control causes the plane to lose altitude and come in to land in an inbound position Then the take-off process begins to work in reverse as the plane comes down to 880 feet, report the ATSC engineers

According to the ATSC flight experts at Wright Field who designed the automatic flight controller, the device is too bulky in its present stage of development to be used for anything but military or experimental purposes They expect research and invention to make it more compact in time, but they will hazard no guess as to how long will be required to make the flight controller practical for commercial or private flying Actual performance data on the automatic flight controller are still "classified material" and not available to the public, says the Army

Emphasizing that the new development is not designed to cut down on the number of flight personnel, the ATSC says no tests have been conducted without pilots and engineers aboard the plane The inventors of the automatic flight controller say no such tests are contemplated They envision pilots monitoring the flight controller with engineers checking its performance For military operations, they add, gunners will still be necessary in combat

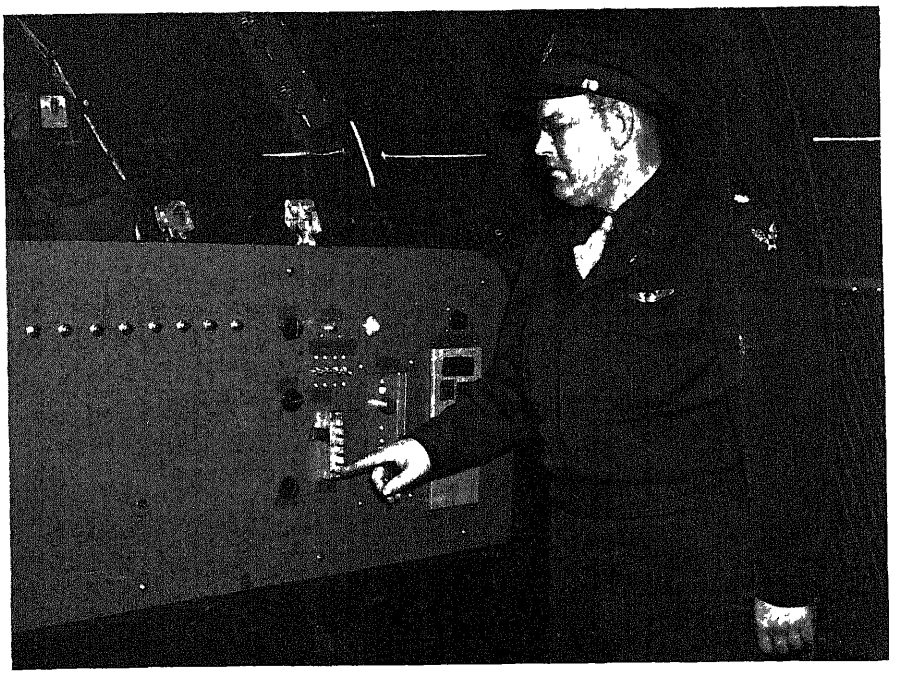
As the first completely automatic flying system, the "push-button" instrument does, however, promise future pilotless airlines for peace and war

Science News Letter, February 23, 1946

CHEMISTRY-ENTOMOLOGY

DDT-Plus-Rotenone Spray Rids Cattle of Ticks

➤ DDT ALLIED with rotenone, one of the older insecticides, have formed a team that promises to defeat fever-bearing cattle ticks in the tropics Applied as a fine, mist-like spray, the double-dose killer has cleaned up from 85% to 90% of the ticks on heavily infested animals over a period of a week Both chemicals



CONTROLS FLIGHT—Push buttons on the Automatic Flight Controller installed in a giant C-54 "Skymaster" cargo plane are explained by Maj Paul R. Biggers, project engineer on the development of fully automatic flight

must be used for best effect, neither produces full results if used alone

Experimental work on the new spray was carried on at the Inter-American Institute of Agricultural Sciences in Costa Rica, under the direction of Robert L. Squibb The spraying has to be done carefully, to make sure that the droplets reach every skin fold where ticks might hide When this is done, however, the method seems to be fully as effective as tank dipping, the method hitherto in partial use in tropical American countries It offers the considerable advantage over dipping that it can be used by any farmer on his home place, and does not involve driving the cattle to the tanks, which are often at quite inconvenient distances

Science News Letter, February 23, 1946

MARINE BIOLOGY

A-Bomb Versus Fish

Results of test at Bikini atoll on fish and other animal and plant life will be investigated by biologists. Effects on fish considered most important.

➤ WHEN THE ATOM bombs burst over Bikini atoll in the forthcoming experimental explosions they will undoubtedly kill a lot of fish, and may do a good deal of damage to the trees and bushes on shore, and to the birds and other land animals that live among them How extensive the damage, and how long it takes wildlife to return to a normal state afterwards, will be determined by precise and long-continued surveys that will be carried on by a group of research biologists Plans for the study of these "bioatomic" effects are now being carefully formulated

Effects on fish are considered most important. Elmer Higgins, chief fishery biologist of the U S Fish and Wildlife Service in Washington, D C, is acting as liaison officer with the joint Army-Navy group that will conduct the bombing tests He has designated three marine biologists chosen from the staffs of the Fish and Wildlife Service and the U S. National Museum, who will concentrate on this one phase of the general problem They will study the effects, both immediate and long-time, on three ecological groups of fish inshore, offshore in the lagoon, and offshore in the open ocean.

A careful survey will be made of fish life in the area before the explosions, and at intervals for many months afterwards, to give as complete and continuous a picture as possible. A corps of expert fishermen is being recruited, to serve as assistants to the three biologists. The Navy will land small craft for use in this work, and also seaplanes for scouting schools of fish

Although fish occupy the No. 1 position in the biological planning, they are by no means the whole story. Biological specialists from several institutions will carry on studies on the plankton, or microscopic plant and animal life that is the ultimate source of all sea food, on the biology and geology of the coral reefs that build all atolls, on the beach and land animals, and on both marine and land plants

Early objections to the bombing experiments, on the score of possible material harm to commercial fisheries and the whaling industry, have been overcome by the selection of Bikini atoll as the site. The fish here, though abundant enough, are too far from any possible market to be of economic significance, and the little island circle is remote from all known paths of whale migration

Science News Letter, February 23, 1946

AERONAUTICS

Speed and Altitude of Plane Constantly Shown

➤ HOW HIGH in the air and how fast the plane is travelling will be known at all times by passengers in new giant Lockheed Constellations Large flight instruments, placed where all may see, will give them the same information that only crew members in the pilot compartment now have While their natural curiosity is thus being satisfied, their bodily comfort will be aided by a new automatic device that will control cabin temperature, ventilation and pressure.

Both the altitude-speed instrument and the cabin regulator are products of the Kollsman Instrument Division of Square D Company.

The two flight instruments are large and easily read, and are placed on the forward bulkhead They are entirely self-operative, and are actuated from regular static lines to the standard Kollsman altimeter and airspeed indicator located in front of the pilots on the instrument board

The cabin control regulator is a fully automatic precision instrument that is set prior to flight As the Constellation becomes airborne, the regulator begins to function and continually maintains the necessary pressure differential between the cabin and the outside at any altitude, and controls the air temperature It relieves flight personnel of the duty of adjusting the pressure and temperature as altitude changes

Science News Letter, February 23, 1946

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DENTISTRY

Preventing Tooth Decay

Anti-caries mouth rinses and tooth powder getting trial as result of discovery of role of ammonia in decay immunity.

➤ HOPE THAT tooth decay may be prevented by use of an ammonia-containing mouth rinse and tooth powder appears in a report which four University of Illinois scientists gave at the meeting of the Chicago Dental Society

The four scientists are Dr Robert G Kesel, Dr Joseph F O'Donnell, Dr Edward C Wach and Dr Ernst R Kirch The paper announcing their studies won the dental society's annual $500 essay competition award

Don't start using the household ammonia from the kitchen or the spirits of ammonia in the medicine chest for a private campaign to protect your teeth from decay. Those are not the kinds of ammonia used in the studies The prescriptions for the anti-caries tooth powder and mouth wash call for ammonia in the form of dibasic ammonium phosphate

Also, the rinse and powder are still on trial and it will be 18 months to two years before the scientists are sure these can prevent tooth decay Patients who have been using them say their mouths feel "exceptionally clean" and dental examinations show that their teeth are notably free of white matter and deposits usually present in cases of active decay

Even more encouraging, those using the ammonia preparations have shown a marked reduction in the number of Lactobacilli acidophilus in their mouths These micro-organisms are used as a "yardstick" of susceptibility to tooth decay.

The idea for using ammonia compounds to prevent tooth decay came from findings Dr Kesel and associates announced to scientists in the scientific journal, *Science,* and which were reported in March, 1945 (*See* SNL, March 10, 1945)

Immunity to caries, or tooth decay, those earlier findings suggested, comes from tiny amounts of ammonia continuously present in the mouth The ammonia comes from a small group of the protein building-blocks known to scientists as amino acids. The lucky persons who are immune to caries have in their salivas enzymes capable of producing ammonia from certain of these amino acids

Science News Letter, February 23, 1946

MEDICINE

Tularemia Remedy

Streptomycin lives up to its promise of succeeding in treatment of the disease. The drug speeds recovery, reduces disability time.

➤ STREPTOMYCIN, penicillin's potent ally in the war against germ diseases, is living up to its promise of being a successful remedy for tularemia, or rabbit fever Its successful use as a remedy for seven tularemia-stricken men and women, following trials on laboratory animals, is reported by Dr Lee Foshay and Dr A B Pasternack, of the University of Cincinnati College of Medicine (*Journal, American Medical Association,* Feb 16)

Swift change "from a state of wretchedness to one of almost complete comfort," dramatic drops in temperature, recovery time and disability period reduced by more than half, are among the results achieved with streptomycin treatment of the seven patients All the patients developed tularemia after handling wild rabbits

"The disease usually causes 31 days of fever, 31 days in bed, a duration of disease of four months characterized by buboes (painful swellings of glands) for 3 5 months, disability for 3 5 months, and a healing time for primary lesions (sores) of 39 days," the Cincinnati physicians point out

In the first case they report, the patient did not get streptomycin until the eighth day of his sickness He had altogether, however, only 13 days of fever, 15 days in bed, and a bubo that could be felt for only 16 days The initial sore on his thumb, although it had been cut open, had healed within 17 days without ulcerating He was totally disabled for 28 days with partial disability for 1 4 months

The other patients showed similar improvement, although the time interval to beginning of streptomycin treatment, symptoms and severity of the attack and the time for recovery varied somewhat

Although serum treatment of tularemia has given good results, these have not been as uniformly good as those with streptomycin in this small group of patients, the Cincinnati physicians observe

Science News Letter, February 23, 1946

PUBLIC HEALTH

"Army of Health" Urged As Part of Program

➤ TRAINING of more personnel to build up an "army of health" for an aggressive attack on the nation's peacetime health problems is urged by Surgeon General Thomas Parran, U S Public Health Service, in the 73d annual report of the service

Although the nation's health record was good during the war years, with no significant increase in the general death rate and a decline in infant mortality, the reconversion period, Dr Parran predicts, will bring health "problems comparable in scope and extent with those of the war"

To meet these problems, the Surgeon General recommends expansion and intensification of all preventive services; establishment of basic health organizations staffed with well-trained personnel for every community in every part of the country; addition of cancer control programs and dental care to traditional public health services, establishment of mental health programs at the community level; inclusion of bedside care as a part of the visiting services of all public health nursing programs, continuation by states and communities of environmental sanitation work, carried on during the war through federal appropriations

Science News Letter, February 23, 1946

Cloth made from grass in China is said to have greater tensile strength and resiliency than ordinary cotton cloth.

What will be probably the largest *concrete dam* ever built is planned to be constructed on the Yangtze river in China; American government engineers have been engaged to assist in design and construction

MATHEMATICS

Adds in 1/5000 of a Second

General purpose electronic computing machine expected to solve problems of nuclear physics, aerodynamics and scientific weather prediction.

See Front Cover

➤ THE FIRST all-electronic general purpose computer ever developed made its debut at the University of Pennsylvania recently Capable of adding numbers in 1/5000 of a second, it will help free scientists from time-consuming routine calculations. The machine is shown on the front cover of this SCIENCE NEWS LETTER being prepared to solve a problem in hydrodynamics.

Originally developed to compute lengthy and complicated firing and bombing tables for vital ordnance equipment, the machine is expected to solve equally complex peacetime problems such as those of nuclear physics, aerodynamics and scientific weather prediction It is capable of carrying out computations 1,000 times faster than the most advanced general-purpose calculating machine previously built.

The most intricate and complex electronic device in the world, the Electronic Numerical Integrator and Computer was built at the Moore School of Electrical Engineering of the University of Pennsylvania for the Army Ordnance Ballistic Research Laboratory at Aberdeen It contains about 18,000 electronic tubes Some idea of the machine's complexity can be gained by comparing it with an average home radio set, which has ten tubes The largest radar set uses 400 tubes, and the B-29 bomber has less than 800 tubes.

The heat generated by the multitude of vacuum tubes is dissipated by a temporary blower system The noise from such a system will be eliminated, however, when the ENIAC is installed in its specially designed air-conditioned building at its permanent location at Aberdeen Proving Ground. The building is expected to be completed some time this summer.

Two comparatively small machines are used with the ENIAC One feeds information into the ENIAC from punched cards and the other receives the results from it in a similar manner

Special equipment allows the circuits to be easily tested. A test bench with its own power supply and electronic oscillographic equipment has been set up so that individual units may be withdrawn and tested without interfering with the operation of the machine

The ENIAC is estimated to have cost around $400,000 This includes all research and development work involved as well as cost of the equipment Future machines of this type can be produced much more cheaply This super computing machine was begun in July, 1943, and finished in the fall of 1945.

The original idea for the electronic general purpose calculator came from Dr John W Mauchly of the Moore School faculty. Dr Mauchly, previously faced with many physical and meteorological problems requiring voluminous calculation, conceived of electronic devices for handling large computing problems in a mass-production manner J. Presper Eckert, Jr, a recent graduate of the Moore School, joined Dr Mauchly in elaborating the plans for the ENIAC and took charge of the technical and engineering work

Capt. Herman Goldstine, mathematician and ballistics expert for Army Ordnance, saw in Dr Mauchly's plans a powerful tool needed by the Ballistic Research Laboratory for handling its overwhelming computational work and enthusiastically promoted the interest of the Ordnance Department in undertaking its development

Col. Paul N Gillon, at that time assistant chief of the research division of the office of the chief of ordnance, enthusiastically sponsored the ENIAC

Science News Letter, February 23, 1946

PHYSICS

Reflectoscope Detects Flaws in Solid Objects

➤ A SUPERSONIC reflectoscope using sound waves to locate flaws in solid objects has been developed at the University of Michigan and is being produced commercially, reports Dr. Floyd A Firestone of the departments of physics and engineering research of the University.

Using a quartz crystal covered with a film of oil to contact the object being tested, the reflectoscope radiates sound waves into the material being tested The radiated waves reflect back to the instrument and are magnified on an oscilloscope screen Flaws are detected by variations in the visible oscillations on the screen

The supersonic reflectoscope sends sound waves into the object being tested for periods as short as a millionth of a second This produces only a few short-length waves that may be easily read on the screen, and it permits the tester to quickly note flaws in materials being examined

In addition to testing the structure of solids such as iron, steel or aluminum, Dr. Firestone says the supersonic reflectoscope may be used to determine the level of liquids inside tanks.

Science News Letter, February 23, 1946

AGRICULTURE-CHEMISTRY

Large Scale Production Of Sweet-Potato Starch

➤ LARGE-SCALE commercial production of sweet-potato starch will start in Clewiston, Fla, next fall, in the newly completed $7,000,000 plant erected by the United States Sugar Corporation Annual output of starch is expected to be 75,000,000 pounds, a valuable by-product will be 30,000,000 pounds of stock feed from the spent root pulp

The starch and its derivatives can be used in a wide range of commercial applications, including food products, adhesives, laundry starch, paper and textile sizings, and even explosives

More than 12,000 acres of rich Everglades soil will be plowed and planted to sweet potatoes Not all the acreage is owned by the company; part of the crop will be raised under contract by local farmers on their own land A new sweet-potato variety, bred for this special purpose, has a considerably higher starch content than ordinary table varieties Individual roots get to be as big as a man's head, and total yield per acre runs from 500 to 700 bushels

Full operation had been scheduled to begin in 1945, but a hurricane ruined so much of the crop that some delay in starting was unavoidable

Science News Letter, February 23, 1946

Canned food 93 years old was found in 1944 on Dealey island in the Arctic north of Canada where it had been placed in a cache by a British ship in 1852, laboratory tests showed some of the food in good condition.

MEDICINE

Heroes of Dogdom

Two mongrels awarded the Whipple Prize for "outstanding services to humanity." Conferred by Surgeon General Kirk for Committee of Scientists.

➤ JOSIE AND TRIXIE, two mongrels who would never win a ribbon at a dog show, have been awarded what might be called the highest prize in dogdom, the Whipple Prize "for outstanding services to humanity."

The award was conferred by Surgeon General Norman T Kirk, U S Army, on behalf of the Sponsoring Committee of Friends of Medical Research. This is a voluntary educational organization sponsored by the New York Academy of Medicine and the Medical Society of the State of New York. The ceremony took place before an audience of distinguished scientists at the American Museum of Natural History in New York

Josie, aged four, and Trixie, aged one, received the award in recognition of their aid to research on blood plasma which resulted in the saving of many lives on the battlefields

The award is named for Dr George H Whipple, dean of the University of Rochester School of Medicine and Dentistry, who in 1934 shared the Nobel Prize in Medicine for work leading to the liver cure for pernicious anemia

Although Josie and Trixie are mongrels with no blue ribbon pedigree, they have two distinguished ancestors, grandparents who were used in the fundamental work leading to the discovery of the cure for pernicious anemia

The parts Josie and Trixie played in the plasma research were described by Dr Frieda S Robbins, Dr Whipple's associate Josie's work, she explained, has been to donate blood plasma, just as human blood donors have done during the war This was then given, she said, to other dogs which had deficient red blood cells and blood plasma protein This determines the production of these substances in the recipient dogs which results from the stimulus of the infusion

Josie has been so occupied since 1941. Trixie, only a year old, has also made a similar contribution, though only during the one year of her life But it entitles her to recognition, too, said Dr. Robbins

"During all this work," she added, "no dog has died except of natural causes"

Describing a "dog's life" in a research laboratory, Dr Robbins explained how dogs are anesthetized and handled the same as persons undergoing operations, if the research investigation could possibly cause suffering Rules to this effect, she said, are enforced in laboratories where research is conducted

"My daily work is with these dogs," she said, "and I seriously resent the statements by uninformed persons that dogs are tortured To assert that men and women scientists inflict pain on defenseless animals is too preposterous to be believed by anybody who knows the affection which we all have for the dogs who help us"

Science News Letter, February 23, 1946



DOGS REWARDED—Dr. Frieda S. Robbins and Surgeon General Norman T. Kirk of the U. S. Army and the two Dalmatian coach dogs that were awarded the Whipple prize "for outstanding services to humanity."

NUTRITION

Bread Tastes the Same

If you eat the new bread made from 80% flour when blindfolded, you cannot tell the difference between it and the present 70% flour.

By JANE STAFFORD

➤ I HAVE JUST eaten a slice of bread made from 80% flour, the kind Americans will be eating in a few weeks to save wheat for starving people in Europe.

If I had been blindfolded, I could not have told the difference between this bread and the slice I had for breakfast from a loaf bought at the grocery

Even seeing the bread, it was hard to detect any difference. It looks like white bread. Compared with bread from 70% flour, its whiteness is slightly less snowy.

The bread I ate was an experimental loaf baked by Dr Lawrence Zeleney, baking technologist of the U S Department of Agriculture It was baked from 80% flour which he milled on a hand-powered mill at the Department's laboratories at Beltsville, Md He used commercial bread-making technique, and from the same formula baked a loaf of bread with 70% flour for comparison Bakers will have to use a slightly different formula, or recipe, for 80% flour bread than they are now using

Housewives may find they can use the 80% flour with little or no change in their favorite recipes Home economists have not yet experimented with the new flour Samples of it were on display at the Department of Agriculture in Washington, D C Though not quite as snowy white and not quite as silky feeling as the 70% flour on display, the difference seemed to me very slight

Neither the flour nor the bread baked from it have any specks of bran in them.

This bread, which you will be eating soon after March 1, will, after all, supply just as much nourishment in the form of B vitamins and iron as the enriched white bread Americans have eaten since January, 1943

The 80% flour does not contain the amount of B vitamins and iron required for enriched bread, but Department of Agriculture officials state that the flour will have to be enriched so that our daily bread will continue to meet the requirements of War Food Order No. 1.

Science News Letter, February 23, 1946

ASTRONOMY

New Exploding Star Duplicating Its Behavior

➤ THE NEW exploding star visible to the unaided eye in the northern heavens (*see SNL,* Feb 16), is staging an almost perfect duplication of its behavior 80 years ago Dr Dean B. McLaughlin of the University of Michigan Observatory said that the fact that the star, I Coronae Borealis, can repeat the earlier performance so closely makes it quite certain that the previous outburst has not altered it appreciably.

The star, previously visible only with a telescope, was first noted without a telescope early in the morning of Saturday, Feb. 9, by Armin J. Deutsch of the Yerkes Observatory of the University of Chicago Following this report, it was observed at the Michigan Observatory the mornings of Feb 10 and 11.

Whatever causes the explosion must be beneath the surface of the star, Dr. McLaughlin said It does not appear likely, however, that it is deep inside, since only a minute fraction of the star's total mass is thrown off as a shell of gas and the remains of the star quiet down in a few years to the same brightness as before the explosion

T Coronae Borealis, which can be seen after midnight in the northern sky, is the fourth star to be recognized with certainty as a recurrent nova It seems probable that in the course of time people here on earth will observe repetitions by many more old novae.

Such repeated explosions, Dr McLaughlin believes, gives a coup de grace to theories of an accidental cause of the nova outburst, such as a collision of two stars, a collision of a planet with a star, or the plunge of a star into a dark nubula. The companion star, a giant red star, takes no part in the violent variations of light

Science News Letter, February 23, 1946

AERONAUTICS

Blind Landing in Bad Weather Will Be Possible

➤ BLIND LANDING in bad weather will be possible with relative safety for aircraft equipped with a new electronic device which automatically guides a plane to the airway by means of very high frequency radio waves transmitted from ground stations. The new airborne control picks up beamed radio waves from the transmitters and directs the plane to follow them down to the airfield The device was developed by the Minneapolis-Honeywell Regulator Company

In use, an official of the company states, a plane, equipped with this specialized radio receiver, is guided in the usual way to within a short distance of the field at which it is to land When close to the field the electronic device picks up radio waves from marker beacons and indicates this contact by a flashing light. The pilot then throws a switch on the autopilot that immediately puts the plane under flight control of "localizer" beams being continuously transmitted from the airport

The plane is automatically guided toward the landing strip until a second signal indicates that it has intersected an additional, or "glide path" beam which is also necessary for instrument approach Throwing another switch puts the plane under control of both the glide path and localizer beam, and steers it toward the landing field at a fixed rate of descent until it contacts the runway.

Science News Letter, February 23, 1946

AERONAUTICS

New Airplane Engine Gives Greater Speed

➤ NEW AIRPLANE engines, the first of the kind ever produced in the United States, will soon be in use in Douglas DC-4 transports and will give these airplanes a 20 to 25 mile-an-hour increase in cruising speed and a payload gain of more than half a ton

The new power unit can be installed in the DC-4 without modifying the frame of the airplane in any way, being equipped with a prefabricated nacelle that attaches directly to the present DC-4 wing and firewall

This engine, designed by engineers of the Wright Aeronautical Corporation, will be known as the Cyclone 9HD and is said to be the world's most powerful air-cooled engine per pound of weight in production today Each engine weighs 1,352 pounds and produces 1,425 horsepower.

Engine maintenance problems also will be simplified by use of the new Cyclone installation. The cowl panel, built in three sections, is held together by special type fasteners that take only a moment to snap open or shut Rear cowl panels may be quickly opened by removing four pairs of bolts

Science News Letter, February 23, 1946

IN SCIENCE

GEOLOGY

Crater Lake Volcano Is Not Dangerous

➤ ANY FUTURE eruptions of Mount Mazama, the Crater Lake volcano, probably will not be violent enough to do any damage beyond killing a lot of fish and spoiling the color of the lake

This is the opinion of Dr Howel Williams, University of California geology professor, who is one of the foremost authorities on the crater Dr Williams studied the crater for five years, and considers it a classical caldera type volcano

"An eruption of the lake today would not kill people," says Dr Williams "Furthermore, I doubt if there is enough activity in the volcano to produce a cone high enough to rise above the level of the lake, which is 2,000 feet deep"

Speculation that the dormant crater might erupt again has been prompted recently by the presence of vapor clouds hovering over the middle of Crater Lake

Dr. Williams explained that Crater Lake caldera was built up gradually over a period of 60 million years of intermittent activity Late in its activity the center of the cone collapsed, a characteristic of all calderas, filling in the great void beneath the earth caused by colossal eruptions of magna in the form of pumice This was how Crater Lake was created

"Once collapse occurs there is little chance of violent activity in a caldera," Dr Williams declared, "although occasional periods of minor activity may occur for an indefinite period."

The studies by Dr Williams show that man entered the Oregon region before the close of the violent period of activity of Mount Mazama In his studies he found artifacts, such as obsidian knives and arrow tips of an ancient Indian race, buried in deep deposits of pumice near the crater. He places the time of this eruption at 5,000 to 10,000 years ago, after Ice Age glaciers began to recede

The last eruption of the volcano occurred about 1,000 years ago, when Wizard Island was formed

Science News Letter, February 23, 1946

E FIELDS

ENGINEERING

Telephone Operates On Push-Button Principle

➤ AMERICANS of the present generation are used to automatic machinery that works when you push a button Yet the one mechanism probably most often used, the telephone, departs from the push-button principle you have to stick a finger or pencil-tip into holes in a dial and turn it around Putting the automatic telephone on a push-button basis is undertaken in an invention on which U S patent 2,394,926 has been issued to Rudolph F Mallina of Hastings-on-Hudson, N Y

On the front of the new instrument, instead of the familiar dial, are ten keys arranged in two banks and numbered from 1 to 0, like the keys of a small adding machine Within the base, the mechanism is not very much different from that of the dial telephone, for each key is so geared that it turns a master-wheel a different number of spaces. Springs return the mechanism to starting position after each push

The inventor has assigned his patent rights to the Bell Telephone Laboratories, Inc

Science News Letter, February 23, 1946

GEOLOGY

Geological Servicemen To Get Retraining

➤ YOUNG GEOLOGISTS who have been so long in the armed forces that their geology may have become a bit rusty are offered on-the-job retraining under a new program that has been set up by the U S Geological Survey. This will be available both to members of the Survey who are returning to their jobs after war service, and to new members whom it will be necessary to add to the field forces The retraining instruction will be limited to the types of operation required in the regular work of the Geological Survey, and expenses will be met out of the Survey's regular funds

Young geologists whose scholastic or professional training was interrupted by the war are expected to complete this, as far as possible, in regularly established university departments of geology. Scholarships available under the G. I Bill of Rights can be used for this purpose. Heads of geology departments in a number of leading universities have indicated their willingness to cooperate in the present program by offering study courses pointed especially at the Geological Survey's immediate needs Among these universities are Chicago, Columbia, Harvard, Johns Hopkins, Princeton and Yale

Science News Letter, February 23, 1946

ELECTRONICS

Large Lathe Produces Super-Voltage X-ray Tubes

➤ THE WORLD'S largest glass-working lathe, as far as known, has been designed and constructed by the General Electric X-ray Corporation in Chicago, and is now in use producing supervoltage X-ray tubes, including doughnut-shaped tubes for betatrons which may have a capacity of 100,000,000 volts The lathe weighs two tons

The lathe is so exactly constructed that it may be called a precision tool Its spindles have a normal capacity of seven and a quarter inches, but it has a possible swing of 42 inches with special chucks It can handle any piece of glass up to 84 inches in length, and tubes small enough to pass through its spindles are limited in length only by the size of the room.

The unit is equipped with a system whereby high frequency current will be passed through its heating flames in order to more effectively heat and seal the glass To withstand the high temperatures used in working with this machine, its heads are equipped with special grease seals capable of withstanding heat up to 200 degrees Centigrade

Science News Letter, February 23, 1946

GENERAL SCIENCE

Stalin Award Made to Russian Ship Designer

➤ REAR ADM PETER Papkovich, corresponding member of the USSR Academy of Sciences, has received the first prize of 200,000 rubles for his work in shipbuilding mechanics, in the latest Stalin prize announcement.

A Russian naval veteran, Admiral Papkovich has studied problems of naval architecture and ship strength His latest work for which the award was made sums up many years of research on ship design

Science News Letter, February 23, 1946

CHEMISTRY

Blanket Patent on Synthetic Weed-Killers

➤ A PATENT covering a multitude of things that all perform the one function of weed-killing is No 2,394,916, obtained by Franklin D Jones of Llanerch, Pa, chemist associated with the American Chemical Paint Company, to which firm he has assigned his rights.

The weed-killers patented by Mr Jones all belong to the general family of chemicals commonly described as synthetic hormones or growth-promoting substances In very small doses they act as stimulants, in higher concentration they are deadly to plants on which they are sprayed or dusted As described in the patent, the herbicides belong to "the group consisting of phenyl, naphthyl, tetralyl, and anthracene monocarboxylic alphatic acids, their salts and esters"

The very sweeping claims made in this patent may provoke some tense legal battles

Science News Letter, February 23, 1946

CHEMISTRY

Gold Plating Measured By New Method

➤ THE THICKNESS of the gold layer on plated jewelry and other articles may be accurately measured by a new chemical-physical method developed by W Stanley Clabaugh of the National Bureau of Standards in Washington, D C. Limited equipment only is required

In this method a very small sample of the material is cut out with a punch and die This sample is about 15 ten-thousandths of a square inch in area It may be of any thickness up to one thirty-second of an inch

Then the base metal is dissolved away with nitric acid, leaving a small circular piece of the gold After washing, the gold is dissolved in a few drops of aqua regia and dried A measured volume of a solution of o-tolidine dissolved in normal sulfuric acid is added to the dried residue

The gold causes the solution to turn yellow, and the intensity of this yellow color is a measure of the quantity of gold present Modern scientific methods are used to determine the intensity of the yellow color Knowing the quantity of gold and the area of the sample, the thickness of the original gold layer is easily calculated

Science News Letter, February 23, 1946

ASTRONOMY

Mercury and Venus Appear

All five naked eye planets visible during March evenings, though not at the same time. Vernal equinox, the beginning of spring, occurs on March 21.

By JAMES STOKLEY

➤ FOR A FEW DAYS, around March 9, it may be possible during a single evening to see all five of the naked eye planets, though they will not be visible at the same time Mercury, the most rarely viewed of the five, will be at its greatest distance to the east of the sun on the 9th Then it will follow the sun in the sky and remain above the horizon after the sun has descended from view. This is not the only time in 1946 that Mercury thus reaches "greatest eastern elongation," as it is called However, when this occurs in March, near the beginning of spring, it offers the most favorable conditions for viewing Mercury. Then the separation from the sun is in such a direction as to bring the planet high in the sky. At other times it is not much higher than the sun—merely farther to the south So then, about March 9, or for a few days before or after that date, one may look to the southwest and there see Mercury, as a brilliant point of light, in the gathering dusk At sunset on the 9th, it will be about 16 degrees above the horizon

23 Times as Bright

Venus is also coming into view It has not separated as far from the sun as Mercury on the 9th, but as it is now some 23 times as bright, that will help to make it visible Venus will appear in the dusk, like Mercury, just after sundown, almost directly west By the end of the month it will be easier to see than earlier in March. Both of these planets set before the sky gets fully dark, and they are not shown on the accompanying maps, which depict the sky for 10·00 p. m on the first of the month, and an hour earlier on the 15th

Three bright planets are shown, however. The brightest is Jupiter, of magnitude minus 1 9, which rises about three hours after sunset, and is then visible the rest of the night It is in the constellation of Virgo close to the star Spica, which is low in the east at the times for which the maps are drawn Though Spica is of the first magnitude, Jupiter is about 17 times more brilliant.

High in the south, visible through the night until about two hours before sunrise, are the two bright planets whose dance in the constellation of Gemini, the twins, we have been watching through the winter They are near the stars Castor and Pollux Saturn is the brightest of this quartet, of magnitude plus 0 2, about 20% brighter than Mars, which is next. Pollux is about two-fifths as bright as Saturn, and Castor is still fainter.

On March 18, Mars, which is moving eastward through the sky, passes Saturn, the second time in two months It passed it on Jan 22, while it was moving toward the west It turned around on Feb 21 Saturn, which has recently been moving westward in the sky, is stationary and then starts an easterly motion on March 20

Brightest star of the evening skies in March is Sirius, the dog star, in Canis Major, the great dog, seen in the southwest. It is just to the left of the prominent constellation of Orion, the warrior Above Sirius is Canis Minor, the lesser dog, with Procyon, just below Gemini, in which Mars and Saturn appear In the south is Regulus, in Leo, the lion

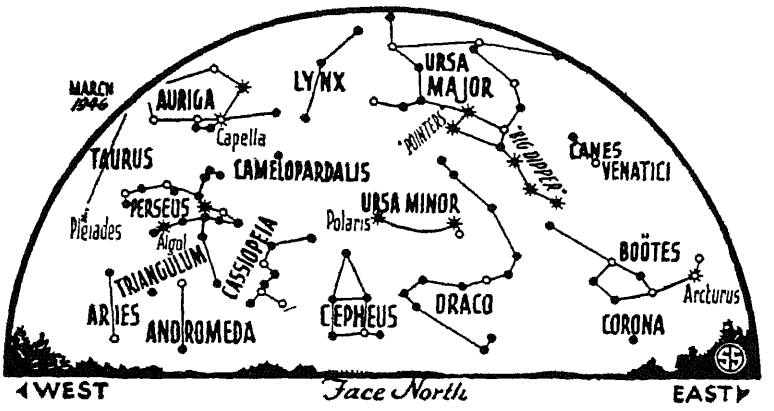
High in the west is Taurus, the bull, with first magnitude Aldebaran and to the right of this figure we see Auriga, the charioteer, in which Capella shines To the east is Spica, already mentioned as near Jupiter, and nearby, to the left, is Bootes, the bear-driver, with Arcturus

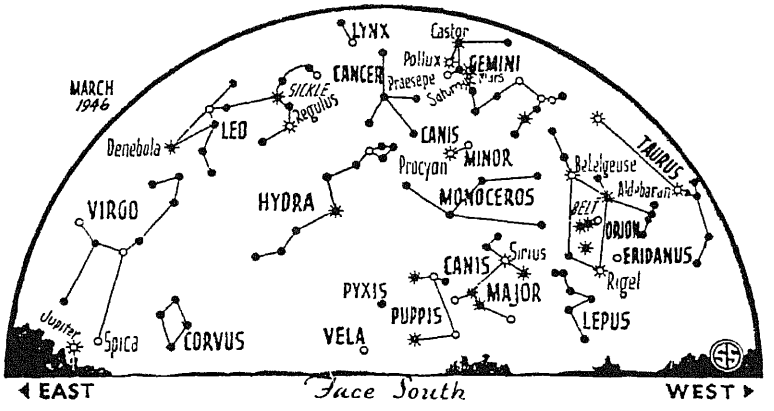
On March 21, at 12:33 a m , EST, so that it happens on the evening of March 20 in central and westerly parts of the country, the sun, which has been traveling northward through the sky since just before Christmas, reaches the half way mark and stands over the equator This event is called the vernal equinox, the latter part of the name meaning "equal nights" At this equinox, like the corresponding one six months later, the sun rises directly east, sets directly west, so it is above the horizon just half the 24 hours and below for the same time That is, it would were it not for the refraction of the earth's atmosphere This effect, which is like that of a prism, makes the sun seem a little higher than it really is, so that we see it before it rises and after it sets for a short time

Apparent Movement

But, regardless of that, the vernal equinox is one of four main points in the sun's annual movement around the sky This is a movement that is only apparent, for the effect is really due to the annual movement of the earth around the sun At different times of year as we encircle it, we find it standing against an ever-changing background so it appears to be the sun that moves The path the sun seems to take is called the ecliptic, and it runs through the consellations of Pisces, the fishes, Aries, the ram, Taurus, the bull, Gemini, the twins, Cancer, the crab, Leo, the lion, Virgo, the virgin, Libra, the scales, Scorpius, the scorpion, Sagittarius, the archer, Capricornus, the sea goat and Aquarius, the water bearer The moon and planets also remain close to the ecliptic, so that its path can roughly be traced from the position of the planets

The ecliptic is inclined to the equator,





☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

the line in the sky directly over the earth's equator, so half the ecliptic is in the northern sky and half in the southern. Thus we can get our four main points. Two are the intersections with the equator. These are the equinoxes, where the sun stands about March 21 and Sept 23 The other two points are the solstices, marking the northernmost and southernmost parts of the ecliptic The former is where the sun stands on June 21 and the latter where it is on Dec 22

As a convenient subdivision of the year, astronomers have long used the passage of the sun through the four quarters of the ecliptic, as marked by the four points mentioned above These they have called "seasons," and the one between the equinox in March and the solstice in June they call spring Therefore, in the astronomical sense, spring commences on March 21 at 12 33 a m , EST

Of course this is an arbitrary division of the year People might do it—indeed, they have done it—in other ways In common speech, for example, we often consider the whole of March, followed by April and May, as spring, and then have summer commencing at the beginning of June Again, we might call summer the quarter of the year during which it is farthest north, beginning not at the solstice, but half way between the equinox and the solstice, or about May 7, and ending at the mid point between the solstice and the following equinox, or about August 9 Then the June solstice would be the middle, and not the beginning of summer, and we would be following an old practice in England, where June 21 is called "Midsummer day" The events of Shakespeare's "Midsummer Night's Dream" occurred at this time

However, this practice is not generally used, and the astronomical usage is very widely followed, with spring commencing with the vernal equinox, and summer with the summer solstice This usage has the advantage of roughly corresponding with the weather, for there is a lag in the seasons as we do not get our warmest weather when the sun is farthest north, but some weeks later

It is true, of course, that what has been said applies only to the northern hemisphere In the southern the seasons are reversed Their autumn comes at the time of our spring, and their winter with our summer This was the reason, a few years ago, that the "American Ephemeris," an annual volume of astronomical tables published by the U S. Naval Observatory, stopped making the statement that, for example, spring would begin on the 21st of March Now they simply state that the equinox or solstice happens on a certain day at a particular time The book is used in all parts of the world, and so now its statement is as true in South America as it is at home

Celestial Time Table for March

March	EST	
3	1 01 a m	New Moon
6	8 00 p m	Moon nearest, distance 227,900 miles
9	11 00 a m	Mercury farthest east of sun
10	2 47 a m	Algol (variable star in Perseus) at minimum
	7 03 a m	Moon in first quarter
12	5 50 a m	Moon passes Mars
	8 32 a m	Moon passes Saturn
	11 37 p m	Algol at minimum
15	8.26 p m	Algol at minimum
17	2:11 p m	Full moon
18	5.15 p m.	Algol at minimum
	8 00 p m.	Mars passes Saturn
19	7.42 p m	Moon passes Jupiter
21	12·33 a m	Sun crosses equator, spring commences in northern hemisphere
22	6 00 p m	Moon farthest, distance 251,600 miles
25	5 37 p m	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, February 23, 1946

Overbaking *potatoes* causes a loss in their vitamin C.

OCEANOGRAPHY

Surf Forecasters Trained During War

➤ SURF FORECASTING was placed on the same kind of scientific basis as weather forecasting by scientists at the Scripps Institution of Oceanography at La Jolla, Calif, and during the war 200 Navy and Marine Corps officers were trained in the new technique, for use in connection with landing operations

The work was carried on under the immediate supervision of Dr Harald U Sverdrup, director of the Institution, with the cooperation of other members of the staff

"It has been possible to establish a relationship between, on the one hand, higher waves," said Dr Sverdrup, "and on the other, the wind velocity and the stretch of water over which the wind has been blowing (the fetch) or the length of time the wind has been blowing (the duration)

"The formulation of these relationships, which was accomplished in the summer of 1943, represents the greatest single accomplishment of the project"

Scientific data accumulated during the long studies have been incorporated in two volumes, published by the Hydrographic Office of the Navy

Science News Letter, February 23, 1946

The *maté tree* or shrub, that supplies perhaps 25,000,000 people with their customary beverage, is a species of the holly.

Tobacco crops in the United States will total for 1945 over 2,000,000,000 pounds, a 4% increase over 1944

Weather ships are vessels stationed at intervals across the ocean carrying U S Weather Bureau observers and instruments, radio reports from them assist in the making of weather forecasts.

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Do You Know?

The *drone bee* has no sting

Fats are also called lipins from lipos, the Greek word for fat

Rayon claimed to be stronger than nylon has recently been produced in England.

The characteristic flavor of *butter* is due largely to biacetyl, this compound, which can be derived from sugar by a fermentation process, is responsible for the improved flavor of margarine during the past decade.

Gasoline is to be made from natural gas in a plant to be erected near Texas gas fields, it is reported, the plant, it is said, will use 65,000,000 cubic feet of gas a day to produce 5,000 barrels of gasoline and 1,000 barrels of diesel oil

Nail-pickers, magnetic bars mounted below trucks to gather up nails, screws, bolts, and other pieces of metal on roads that might puncture tires, are sometimes strong enough to pick up a nail embedded an inch deep in gravel.

Chemical analysis of *exhaust gases* from various gasoline engines show that they vary greatly, the controlling factor being the amount of fuel consumed and the air-gasoline ratio produced by the carburetor adjustment.

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ZOOLOGY

NATURE RAMBLINGS by Frank Thone



Snow-King

➤ AN OLD RIDDLE takes the form of a problem A hunter left camp, going seven miles straight south Then he turned straight east and went another seven miles At the end of this trek he saw a bear, which he killed and skinned Packing the skin, he went seven miles straight north, which brought him back to camp. What color was the bear?

There is only one correct answer White For the only place in the world where a triangular course like the one described would bring you back to the point from which you started is the North Pole And if hunters ever got as far north as that, the only bears they would find on the ice floes would be polar bears, which are always white

The polar bear is exceedingly well adapted to its environment That snowy coat enables it to approach its prey on land with minimum risk of detection, and when swimming in the sea it might easily be mistaken for a floating cake of snow-covered ice Even in summer, when much of the snow melts off, even in the Arctic, the white coat is still no handicap, for there are always enough residual banks and patches of snow lying about to permit the animal to maintain its white camouflage the year round

Since the principal food of the polar bear consists of seals and fish, it is usually found near the water, and very often in it So completely is the animal given to a marine habitat that its very name smells of the sea Its generic name, *Thallasarctus,* is Greek for "sea-bear," which is further underlined by its Latin specific name, *maritimus.* Zoologists who have observed this bear in its native waters state that it is a tireless swimmer, though not a very rapid one, and is sometimes encountered miles from the nearest land.

It is probably the most completely fur-clad animal in the world Almost all other mammals, including all other bears, have hairless soles to their feet, but the polar bear is furred on the soles as well as everywhere else These furry soles apparently give it a considerable advantage in walking on ice and clambering over slippery seaside rocks

In its native realm the polar bear is undisputed master, there is no animal bigger or stronger, save the bull walrus, which isn't built for aggressive warfare The only creature the polar bear needs to fear is man—especially man with-gun That is why you sometimes see beautiful white bearskin rugs

Science News Letter, February 23, 1946

HOME ECONOMICS

Thin Honey by Adding Water, Heating Slightly

➤ TO THIN HONEY, which is normally too thick to use in sweetening fruit, dry cereals and iced tea, add a little water and hold over a low flame until the honey and water combine. Avoid high heat which drives off the delicate flavors and is likely to scorch the honey, advise honey experts of the U S Department of Agriculture About a tablespoon of water should be used for each cup of honey

Thinned honey should be kept in a covered jar in the refrigerator Like other thin syrups, thinned honey may ferment or mold within a month unless it is kept cold

Science News Letter, February 23, 1946

Bright noon *sunlight* is perhaps a million times brighter than moonlight

An exhaustive survey of Japan's *forest* reserves and its forest industries is being made by three American government foresters to determine whether permanent employment can be found for former workers in war industries

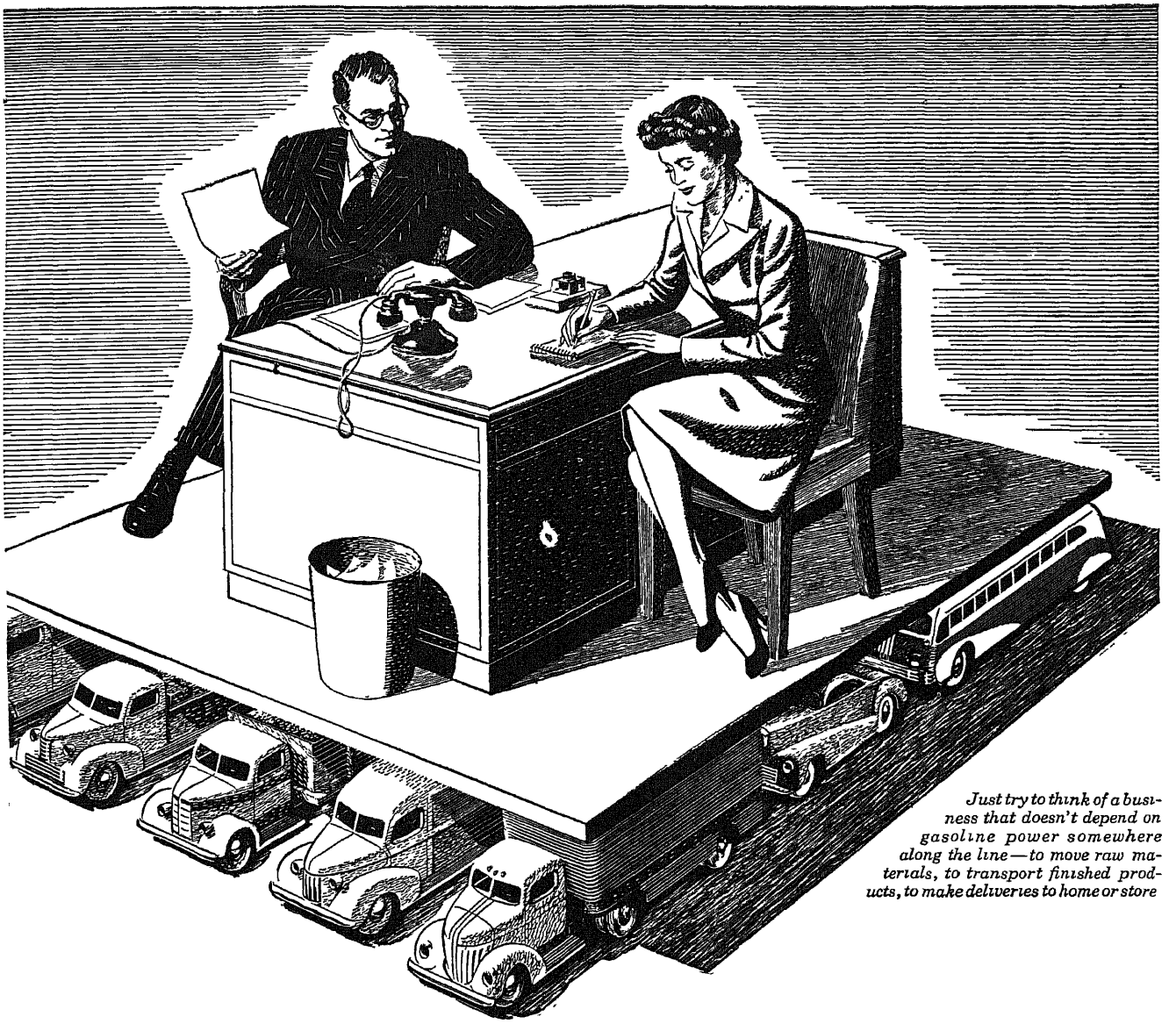
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• Books of the Week •

ADOLESCENCE AND YOUTH—Paul H Landis —*McGraw,* 470 p, illus., $3 75 Shifts the perspective from the internal mechanisms which provoke adjustment problems to the social structure, discusses the problems of the adolescent in the moral, marital and economic fields and recognizes the respective problems of youth groups in town, village and open country

ALGEBRA *A Second Course*—R Orin Cornett—*McGraw,* 313 p, diagrs, $2 A fresh approach to the subject aimed at providing motivation, recognition of significant principles, and mastery of operational techniques

CAREERS IN FORESTRY—*Dept of Agriculture—Government Printing Office,* 23 p, illus, 10 cents U S Department of Agriculture, Miscellaneous Pub No 249

CONDUCTORS AND WIRING LAYOUTS—F S. Lincoln—*Duell,* 342 p, tables and illus, $3 Construction and operation of every type of conductor and conductor insulation, along with instruction for wiring motors, welders, capacitors, switchboards, lighting and communication systems

DEVELOPING MARKETABLE PRODUCTS AND THEIR PACKAGINGS—Ben Nash—*McGraw,* 404 p, tables and illus., $5 Analyzes the many considerations affecting design and development which influence the marketing success of mass-production products and processes, and demonstrates the actual procedures in product-package development

THE EARLY HISTORY OF THE IDEA OF THE INHERITANCE OF ACQUIRED CHARACTERS AND OF PANGENESIS—Conway Zirkle—*Am. Philosophical Soc,* 151 p, $1 25 Transactions of the American Philosophical Society, vol 39, part 2

ELEMENTS OF BACTERIAL CYTOLOGY—Georges Knaysi—*Comstock Pub Co,* 209 p, charts and illus, $3 50 A textbook

FAMILIAL NONREAGINIC FOOD ALLERGY, Arthur F Coca, M D—*C C Thomas,* 191 p, tables and charts, $3 75 A new method of approach to the diagnosis and treatment of the relatively large group of allergic diseases in which the usual cutaneous tests fail almost entirely

HELPING DISABLED VETERANS—*American National Red Cross,* 72 p free Simple facts about the physical and emotional symptoms of the disabled veteran and homely ways of making him comfortable

INDUSTRIAL ELECTRICAL WIRING Wiring Methods and Fittings—E S. Lincoln—*Duell,* 336 p, tables and illus, $3 Analyzes phases of construction, operation, and maintenance of the systems for both a c and d c wiring recognized by the National Electrical Code

INTERNAL COMBUSTION ENGINES—V L Maleev—*McGraw,* 636 p, charts and diagrs, $5 2nd ed. Revised edition of a well-known manual providing a general foundation in the theory, design and operation of internal combustion engines.

MANUAL FOR WATER PLANT OPERATORS—A A Hirsch—*Chemical Pub Co,* 386 p., diagrs, $6 50 Latest developments in water technology and a comprehensive picture of correct operating practice, for use as a text or reference book.

ORGANIC REAGENTS FOR ORGANIC ANALYSIS—Staff of Hopkins and Williams Research Laboratory—*Chemical Pub Co,* 175 p, tables and diagrs, $3 75 Reference book on the use of organic reagents in preparing derivatives of organic substances for the purpose of identification by melting points

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PRIMARY AND STORAGE BATTERIES—E S. Lincoln—*Duell,* 168 p, diagrs. and illus., $3 The application and selection of dry cell, wet cell, caustic soda, and copper-oxide batteries, and of the lead acid and nickel-iron types of storage batteries Also gives instruction for the selection and use of battery accessories

PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY, vol. 90, no 1, Symposium on Atomic Energy and Its Implications *Am Philosophical Soc,* 79 p, $1 Papers read at the joint meeting of the American Philosophical Society and The National Academy of Sciences, Nov 16-17, 1945

PROCEEDINGS OF THE CONFERENCE ON QUARTERMASTER TEXTILE RESEARCH—*Textile Research Institute,* 61 p, illus, $1 Papers on the wartime accomplishments of the Quartermaster Corps of importance to the textile industry, includes an outline of areas in which further research is needed

REPORT OF THE NATIONAL ACADEMY OF SCIENCES —Fiscal Year 1943-1944—National Research Council—*Government Printing Office,* 154 p, tables, 30 cents

SOAP IN INDUSTRY—Georgia Leffingwell and Milton Lesser—*Chemical Pub Co.,* 204 p, $4 Useful hints for chemists, manufacturers, salesmen in the utilization of soap in many manufacturing processes

OUR TEEN-AGE BOYS AND GIRLS Suggestions for Parents, Teachers, and other Youth Leaders—Lester D Crow and Alice Crow—*McGraw,* 366 p, $3 Home, school, vocational and social adjustment of young people

TRANSACTIONS OF THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS — Vol XXXVI—*Wis Acad Sci Arts and Let.,* 495 p, tables and illus, $3 Papers in specialized fields in geology, ecology, anthropology, literature, etc

VD MANUAL FOR TEACHERS—Samuel D. Allison and June Johnson—*Emerson Books,* 149 p, $2 An aid for building a program of venereal disease education in the secondary schools Includes a survey of existing programs in this field, information for the teacher, and many suggestions for teaching aids

Science News Letter, February 23, 1946



Reading Micromax Recorders in Penicillin Plant of Charles Pfizer & Co

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CHEMISTRY

New Process Makes Black Stainless Steel

➤ IF YOU GET articles of stainless steel that have a shiny black finish instead of the familiar bluish-white sheen, they will probably have been made by the process on which patent 2,394,899 was granted to I C Clingan of Baltimore, assignor to the American Rolling Mill Company The black finish is obtained by immersing the stainless steel in a bath of molten potassium dichromate and sodium dichromate for from two to 30 minutes, at a temperature range of 320 to 500 degrees Centigrade

Science News Letter, February 23, 1946

ELECTRONICS

Peacetime Radar

Marine systems must be reliable but not too costly, and capable of operation by the regular complement of officers of the ship.

➤ MARINE RADAR for peacetime use, to help avoid collisions and to save lives, property and time, must be properly designed for the job The radar set on a vessel must be reliable, not too costly, have low minimum range, and be capable of operation by the regular complement of officers of the ship

Military radar systems, developed for such varied purposes as surface search, aircraft detection, height finding, gunfire control, range finding and other wartime uses, were designed for these special purposes. The very design elements that produced excellent military radar are often those which make for an unsuitable peacetime radar, according to radar experts

This is the opinion of L H Lynn and O H Winn, both of the General Electric Company, expressed at the meeting of the American Institute of Electrical Engineers in New York They discussed the design requirements for peacetime radar, particularly as applied to surface ships

"Maximum ranges of military equipment frequently exceed a hundred miles and require appropriate high power for such a range," they said "A passenger ship is much more concerned with an obstacle which may be only several miles away, hence a large equipment is neither justifiable nor desirable"

"Minimum ranges of a destroyer's radar may well be a mile or two, on the theory that an enemy must be discovered long before he can approach that close," it was explained "Minimum range of a radar for a cargo ship is required to be less than a ship-length, the shorter the better, in order that navigation may be safely accomplished in congested harbors"

Early in 1943, a modification of the military ship-borne search radar was installed as an experiment on an ore boat on the Great Lakes It proved to be a highly useful navigational tool, the G-E engineers stated, but was too complex for non-technical personnel to use As a result a relatively simple radar system was developed which is now called an "Electronic Navigator"

This has three units, antenna system, console and motor-alternator The console, they explained, contains the transmitter, receiver, cathode ray tube, sweep circuits, pulsing circuits, rotating field mechanism, appropriate power supplies and controls.

"The pulse," they continued, "is considerably less than one microsecond in length and repeats at approximately 1000 cycles per second Thus the peak power delivered to the magnetron is of the order of kilowatts, though the average power is but a few watts"

At the same meeting, R C. Jensen and R A Arnett, also of General Electric, presented technical information on the peacetime role of airborne radar for navigation and obstacle detection

Science News Letter, February 23, 1946

Vanilla was unknown throughout the world except to the Aztec Indians in Mexico until 1518, when Spaniards under Cortez landed at Vera Cruz

Dithane, a new organic fungicide developed by the Connecticut Agricultural Experiment Station two years ago, is effective in controlling celery blight

A *helicopter* has been used experimentally to deliver pipe for pipelines to inaccessible places in swamps and jungle, it carried 1,000 pounds of pipe strapped to the outside of the plane.

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Science News Letter, February 23, 1946

⚙ *SAFETY DEVICE for gas burners keeps liquids on the stove from extinguishing the flame when they boil over. It consists of an inverted circular convex disk that covers at least one of the inner rings of holes in the burner from which gas escapes, and protects them from boiling-over water.*

Science News Letter, February 23, 1946

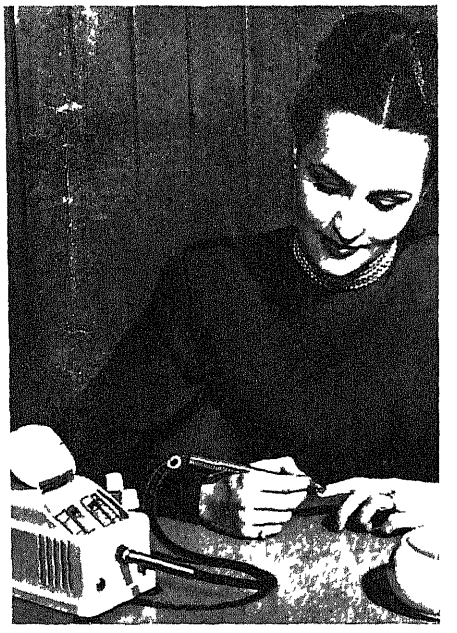
⚙ *COLLAPSIBLE decoy duck of rubber or rubberized fabric, just patented, remains upright in rough water because its under side is shaped like a large inverted cup. No weights are needed to maintain stability When being readied for use, it is blown up like a football*

Science News Letter, February 23, 1946

⚙ *BARBECUING attachment for home cooking ranges, which constantly rotates the meat being cooked, is in a single unit that may be easily inserted in and removed from the broiler drawer of the electric or gas stove. A steam generator, part of the device, operates a motor that turns the spit.*

Science News Letter, February 23, 1946

⚙ *ELECTRICAL manicurist consists of a small motor housed in a plastic box,*



a flexible cord to transmit rotary motion to the operation tools, and the tools themselves which provide disk filing, cuticle rolling, nail buffing and oil massaging The simplicity of the device is shown in the picture

Science News Letter, February 23, 1946

⚙ *EGG DECAPPER cuts off one end of a soft-boiled egg without spilling the contents of the shell. The egg is placed upright in a special egg cup The decapper is placed over the egg and an extended arm, carrying a cutting blade, is rotated.*

Science News Letter, February 23, 1946

⚙ *HAND WASHING machine is a device to aid a man with only one hand to soap, scrub and rinse it with virtually no effort on his part When he sticks his hand into the device, the rest is automatic*

Science News Letter, February 23 1946

⚙ *HAIR CURLER of the spool type, with its surface gradually lessening in diameter from the ends toward its center, carries two rows of comb teeth to grip the strands of hair and hold them firm The teeth points do not project beyond the outer circumference of the ends of the spool*

Science News Letter, February 23, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St, N W, Washington 6, D C, and ask for Gadget Bulletin 299*

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Question Box

AERONAUTICS

How great is the possibility of "push-button flying? p 115

ASTRONOMY

How many planets are visible during March? p 122.

CHEMISTRY

What spray has been found effective in ridding cattle of ticks? p 115.

DENTISTRY

What new tooth decay remedies are offered? p. 117.

ENGINEERING

How would a push-button telephone work? p. 121.

GEOLOGY

How dangerous is Crater Lake volcano? p. 120.

HOME ECONOMICS

What is a good way to thin honey? p 124

NUTRITION

How apparent is the difference between the new bread and the old? p. 119.

MATHEMATICS

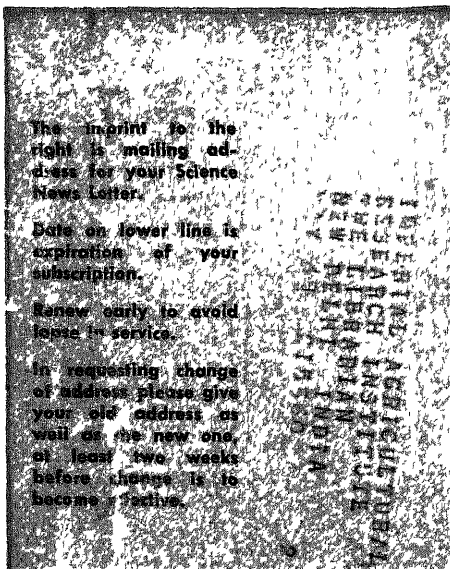
What machine can add numbers in 1/5000 of a second? p 118

MEDICINE

How successful has streptomycin been in the treatment of tularemia? p. 117.

Who are Josie and Trixie? p 119

Where published sources are used they are cited.



SCIENCE NEWS LETTER

Vol. 49, No. 10

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 9, 1946



Radio And Radar

See Page 150

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946



Wave Makers

"A leaping trout awakens the still pool to life in waves that move in silent rhythm"

In the same way, when you speak over the telephone, vibrating electric currents speed silently away with the imprint of your voice over the wire and radio highways of the Bell System

Tomorrow, the vibrations will be the living pictures of television All are examples of wave motion

How to produce, transmit and receive electrical wave motion is the basic problem of the communication art

Bell Telephone Laboratories, which exist primarily to invent and develop better communications for the Bell System, devote the teamed efforts of physicists and mathematicians to the production and control of electric waves in all forms

Out of these fundamental studies have come the discoveries which keep the Bell System at the forefront of the communication art.

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR THE CONTINUED IMPROVEMENT OF TELEPHONE SERVICE

MEDICINE

New Penicillin Triumph

The drug saved a patient with blood disease following gold salts treatment for arthritis. Called most potent remedy for condition.

➤ A PATIENT so sick that on one day his physicians feared for his life was on the next day "suddenly almost well," thanks to penicillin which rescued him from agranulocytosis, serious blood disorder in which the white cells are lacking

The case is reported by Maj Edward W Boland, Capt Nathan E Headley and Col Philip S Hench, of the Rheumatism Center of the U S Army, Hot Springs, Ark (*Journal, American Medical Association,* March 2)

The patient in this case was a 39-year-old officer who had been getting gold salts treatment for chronic rheumatism Some persons are sensitive to gold and are poisoned by the treatment even when it is carefully given Agranulocytosis is one of the severe, potentially fatal conditions which may develop as it did in this officer's case

Agranulocytosis may be caused by other chemicals, such as sulfa drugs, thiouracil, a new and effective remedy for toxic goiter, and certain coal-tar chemicals in headache remedies The bone marrow in such cases is damaged so that it fails to produce white blood cells When the body is robbed of these natural defenders, it is an easy prey to invasion by disease germs It is this germ invasion that kills the patients

Penicillin acts as a temporary substitute for the white blood cells, holding the germs at bay until the bone marrow can form a new army of defending white cells

Prompt recoveries in 10 cases besides that of the officer have now been reported as a result of penicillin treatment of agranulocytosis

Penicillin is now "the most potent remedy" for prevention or control of this dangerous condition, the medical officers state In their opinion it allows for much more optimism about the outcome of the disease in future patients

Science News Letter, March 9, 1946



FIRST TO LIVE—These Surinam toads at the zoological park in Washington, D. C., are the first to survive in captivity. Of the 26 born recently, 22 are still living and growing on a diet of white worms. They will be five inches long when full grown. Photograph by Fremont Davis, Science Service staff photographer.

METALLURGY

Low-Melting Gold Alloy

Gold-germanium alloy, 88% gold and 12% germanium, is hard and has superior wearing qualities. Is useful in jewelry and dentistry.

➤ A LOW-MELTING gold alloy with several other unusual properties was described at a meeting of the American Institute of Mining and Metallurgical Engineers in Chicago by Dr Robert I Jaffee of the Battelle Memorial Institute, Columbus, Ohio, where the alloy has been recently studied

It is a gold-germanium alloy, 88% gold and 12% germanium The latter is one of the less known metallic elements, but it is mined in the United States and is considerably cheaper than gold. The alloy melts at 673 degrees Fahrenheit, only 50 degrees higher than the melting point of lead. It is what scientists call a gold-germanium "eutectic," a term applied to an alloy with a lower fusing point than its components have by themselves Gold melts at 1945 degrees Fahrenheit, and germanium at approximately 1760 degrees.

This eutectic is harder than ordinary gold alloys and has superior wearing qualities These properties make it of value in jewelry Another property of the alloy, Dr. Jaffee stated, is its slight expansion on solidification, which compensates for contraction in cooling to room temperature Because of this property, he said, extremely precise castings, such as dental inlays, can be made, and these dental castings would require no correction to take care of shrinkage that occurs with most alloys

Because of the low melting point of the alloy, it can be used as a solder by jewelers doing repair work on gold jewelry. They can obtain the necessary heat to melt it with a common gas flame.

Gold-coated jewelry of long-wearing properties can be made by merely dipping the object to be plated into the molten eutectic

This gold-germanium alloy is not entirely new to metallurgists It was first mentioned in an obscure German publication, Dr. Jaffee said. But Battelle Institute has been conducting experiments with it to determine its best uses The chief interest in the metal at the present, he stated, is its potentialities as a rectifier in radar equipment

Germanium is produced as a by-product in the production of cadmium It resembles silicon in appearance and is closely related to silicon in nature, he explained It was first discovered by a German scientist in 1886, but little thought was given to its utilization until recent years. The U S Bureau of Mines states that germanium is a crystalline gray-white metal, with chemical properties intermediate between those of silicon and tin While far from being abundant, germanium can be recovered in rather large quantities in the form of its oxide, as a by-product of zinc. Dr. Jaffee stated that about a ton a year is produced in America

Science News Letter, March 9, 1946

ENGINEERING

Nazis Lagged in Rubber

Lack of prewar cooperation between production and tire industries responsible for slowness of progress in Buna rubber development.

➤ THE GERMAN rubber industry, postwar investigations by American scientists reveal, had not progressed relatively as far as the American rubber industry in the use of their Buna type synthetic rubbers, Earl W Glen of the U S Civilian Production Administration told scientists attending a meeting of the Society of Automotive Engineers in Detroit And this in spite of German pioneering work on synthetic rubber during the prewar years

This particular session of the SAE is designated as a German Engineering Evaluation meeting, given largely to reports by specialists on technical matters concerning German automotive war equipment and such accessories as tires, fuels and lubricants An exhibit of German military and automotive vehicles featured the meeting

The backwardness in the German synthetic rubber program was attributed by Mr Glen, whose permanent position is with the Goodyear Tire and Rubber Company, to a lack of cooperation between the synthetic production industry and the manufacturing companies using the product This situation changed rapidly as Germany prepared for war, he said, but the opportunity for close cooperation in the development of better synthetics on a production scale was lost and the industry was obliged to accept existing materials just when it was necessary to go into large-scale production as Germany mobilized for war.

Tire and rubber goods manufacturers were very critical of the Buna rubber they were forced to use Under pressure from them, I. G. Farbenindustrie developed Buna S-3, he said, which eliminated some of the production difficulties and improved the performance of rubber products, particularly tires The development of Koresin for compounding with synthetic rubber to improve the tackiness facilitated tire and mechanical goods production.

German equipment for brass-plating metal goods to facilitate bonding synthetics to track blocks and bogie rollers was excellent, Mr. Glen stated. An improved method of bonding these articles was in process of development in the I. G Farbenindustrie laboratories at Leverkusen "wherein a coating of a new chemical called Desmodur R could be applied more efficiently than brass plating and produced a more uniform and satisfactory bond" Desmodur R was also used as a tire cord dip and general tackifier in the German tire industry

Luka Reifen and Draftband Reifen were interesting German developments The first was a tire unit with a cellular solid rubber filler which was claimed to be very successful in operation without air The Draftband Reifen was a tire without a steel base band, using bead wire embedded in a bevelled hard-rubber base as the surface to mount on a bevelled split rim

Science News Letter, March 9, 1946

CHEMISTRY

New Elements Described to Young Science Winners

➤ TWO NEW elements that are not yet in chemistry textbooks were described to 40 high school scientists by an atomic scientist who helped discover the elements.

Dr Glenn T Seaborg, University of California chemist and co-discoverer of elements No 95 and 96, even offered the youthful scientists a chance to help write the history of chemistry as he told them suggestions of names for the new elements were still being considered

The atomic scientist spoke to the 29 boys and 11 girls at a meeting of the Science Talent Institute sponsored by Science Clubs of America, administered by Science Service

Still unnamed, elements 95 and 96 were produced at the University of California by bombarding the 238 isotope of uranium and 239 plutonium with alpha particles, Dr Seaborg reported

He said that the new elements would probably fit in the chemists' charts as members of a new series of elements

"The elements actinium, 89, thorium, 90, and protactinium, 91, are the first elements in this new rare-earth-like series which corresponds very much to the series of elements that begins with lathanum, which is farther down in the scale of atomic numbers," Dr Seaborg explained

Stressing the importance of element 94, plutonium, to chemistry as well as the atomic bomb, the University of California chemist pointed out that it was the first time in which laboratories had produced an element to prove that it existed in nature

Admitting that the social and political consequences of the atomic bomb had outweighed scientific consideration in the public mind, Dr Seaborg said that in the future work done in the development of the bomb will assume an important place in chemical history.

Science News Letter, March 9, 1946

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ALBINO GOPHER—Two albino gophers were captured by a student in the Fillmore Joint Union High School, Fillmore, Calif., and this one was photographed by Dr. James E. Bliss. W. L. Hall, instructor in biology and physiology at the school, states: "These two animals were pure albinos, having even whiter coats and pinker eyes than my rats, which are of true Wistar strain."

GENERAL SCIENCE

World University

Has been suggested to UNESCO from several quarters to encourage scientific research and higher education at international level.

By VICTOR COFMAN
Science Service Correspondent

➤ A WORLD UNIVERSITY is advocated from several quarters, who have communicated their suggestions to the Secretary of UNESCO, the United Nations, Educational, Scientific and Cultural Organization

The Colombian delegation was among the first to ask for a University of the United Nations in order to encourage scientific research and higher education both in technical science and in other branches of human knowledge

The International Committee for a World University Alliance of New York, created to promote the establishment of a world university, has submitted a scheme for a World University Charter

Dr. Maxwell Garnett, formerly of the League of Nations Union, suggested that UNESCO should take steps for the creation by UNO of an international university, established mainly for research workers qualified in a number of fields

Dr Hugh Trowbridge (U S A) proposed the establishment of a United Nations University in realization of Article 62 of the Charter At the same time he suggested the creation of degrees for the United Nations, a program of study, means for promoting the scheme and a method for the selection of candidates for this university

All these proposals, and many others dealing with the future work of UNESCO in the educational and allied fields, have been referred for further study to special committees.

Month of Culture

➤ A UNESCO month, during which lectures, exhibitions and films would bring out vividly the value of international cultural cooperation to the public has been agreed upon as an important early feature by the United Nations Educational, Scientific and Cultural Organization The UNESCO Month is to precede the annual conference which, according to its Constitution, UNESCO must arrange every year in a different country.

These intellectual and artistic manifestations are designed to bring about the right atmosphere in the host country, and to provide at the highest level a discussion on current intellectual and spiritual problems The host country would be stimulated to mobilize all its best intellectual and artistic resources to the advantage both of its own people and its distinguished guests, and these would enable the conference to start its proceedings in a spirit attuned to the nature of its task It is not intended that this UNESCO Month should deal exclusively with the culture of the host country Leading authorities in other countries would no doubt cooperate in this work of international understanding

This scheme, which was put forward by the Executive Secretary of UNESCO, Sir Alfred Zimmern, was approved by the preparatory commission. The first UNESCO Month will probably be held in Paris next fall

Science News Letter, March 9, 1946

CHEMISTRY

"Goop" Now Reducing Forest Fire Hazard

➤ "GOOP," the fire-spreading jelly that helped to lay Tokyo and other Japanese cities in ashes, is now playing a paradoxical role in saving American forests from fire It does this by helping to burn, under watched and controlled conditions, the tops, branches and other debris left after logging operations, which form a bad fire hazard if left to themselves.

"Goop," whose more proper name is Pyrogel, is a greasy jelly containing magnesium powder It was the most destructive of known incendiary bomb fillers at the end of the war Another incendiary mixture, a liquid known as Napalm, also promises to be useful in removal of fire-hazardous forest slash.

The Army has about 50,000,000 pounds of "Goop" left on hand. It has no possible use except to start fires. To destroy it by burning would cost an estimated $200,000, and dumping it into the ocean would probably produce protests from conservationists Hence any use that can be made of it in starting slash-removal fires is just so much cash saved to the taxpayers

Science News Letter, March 9, 1946

Human hair grows faster in summer than in winter.

GENERAL SCIENCE

Science Talent Institute

Forty boy and girl winners in the Fourth Annual Science Talent Search, during honor-trip to Washington, are addressed by leading scientists.

See Front Cover

➤ THE YEAR'S talented young scientists of America attended the five-day Science Talent Institute in Washington (March 1-5) as the culminating event of the Fifth Annual Science Talent Search for the Westinghouse Science Scholarships This educational event is conducted by the Science Clubs of America, administered by Science Service

This issue of SCIENCE NEWS LETTER reports some of the highlights of the sessions. The next issue will continue this report

The picture on the front cover of this SCIENCE NEWS LETTER, by Fremont Davis, Science Service staff photographer, shows Dr J A Hutcheson and a group of winners after his talk on "Radio Location and Radar," given before the Science Talent Institute.

Dr J A. Hutcheson, associate director of Westinghouse Research Laboratories

Radar, the device that played many important roles in winning the war, will find countless more uses in peacetime Originally radar was a device to detect enemy planes. By the end of the war, it was used to guide friendly planes to their targets, fire guns and direct searchlights.

Amazing and varied as have been the wartime applications of radar, the peacetime potentialities of the field still remain largely untouched, but ready for scientific exploration and expansion

Considering that vacuum tubes for radio used during World War I have since been developed to perform such tasks as welding, controlling the speed of motors, opening doors and sorting products, the future applications of radar's electronic tubes are beyond the imagination.

Tubes with the circuits built inside them and other radar tools can be built in quantities rivalling the production of standard radio tubes.

Radar has extended the radio frequency spectrum by 100 times. The tubes and other components that exploit these fantastic frequencies are so vastly different from the concept of comparable prewar equipment that the possibilities of different combinations of the components have not been explored

Thus, television and frequency modulation that incorporate many improvements are at hand Color television and three-dimensional reception are within our grasp And radar in its present form —to aid navigation, control airplane traffic and afford point-to-point communication as does the Army's famed "walkie-talkie"—poses only minor conversion problems for such uses in peacetime.

Dr Marshall Stone, Harvard University

➤ ONE of the very important factors in the rapid progress of science and technology is a firm command of higher mathematics Everyone realizes quite clearly that the advance of modern science has come to depend upon the availability of well-organized laboratories, expensively fitted out with all kinds of specialized equipment, such as the cyclotron, the betatron, and the wind tunnel Not everyone realizes so clearly that the advance of modern science depends upon the existence and exploitation of a large body of subtle, highly ingenious mathematics, which is continually expanding, thanks to the persistent efforts of professional mathematicians

Some of the most spectacular contributions of mathematics to the advance of our scientific knowledge deserve to be cited in illustration of this fact They will show us, if we look at them carefully enough, some of the reasons why mathematics plays such an important part in scientific research and development and also some of the limitations upon its powers Suppose we begin by giving our attention to the physical phenomena of radio. The essential physical fact on which we rely is the fact that energy can be propagated by radio waves over very great distances How did this fact come to be observed and understood in its minutest details, with the consequence that, in due course, we are now able to enjoy this marvelous facility of communications? Clerk Maxwell was the mathematical father of radio

History records that this great English physicist of the nineteenth century, casting the laws of electro-magnetism as observed by Faraday into a unified mathematical form, deduced from their mathematical statement the logical consequence that wave-propagation of energy should be possible Looking back, we can summarize Maxwell's achievement in a sort of syllogism Faraday's laws are confirmed by experiment, Faraday's laws imply wave-propagation, hence wave-propagation can be confirmed by experiment It was several years before the conclusion was verified by the German physicist Hertz, who set up a suitably designed experiment and obtained the confirmation desired It is, of course, futile in one sense to explore the "might-have-been"—but are we not reasonable in imagining that, in the absence of a mathematical analysis like Maxwell's, physicists might not have looked systematically for this confirmation and might not readily have understood or appreciated the nature of such observations as they might have stumbled on by chance? An equally spectacular instance of the power of mathematical analysis in dealing with physical reality is a quite modern one, to which very little attention has been paid outside professional circles This was the discovery of the positron

The positron's discovery was made in the laboratory by the contemporary American physicist Anderson but—and this is what I want to emphasize—the stage for this discovery had already been elaborately set by the mathematical theories of the English physicist Dirac Dirac's brilliant formulation of the laws of quantum physics led him to the logical conclusion that Nature's observed behavior is such as to allow the electron to have a hitherto unsuspected twin, of equal mass but opposite electrical charge Thus, when Anderson's observations were made, more or less by chance in the course of experiments directed toward other ends, they could at once be fitted into the general picture without any misgivings as to their implications for physical theory If we try to put Dirac's contribution ex post facto into a syllogism, it would perhaps run somewhat as follows: the fundamental laws

of quantum physics, including those governing the electron, are confirmed, if the fundamental laws of quantum physics are correct, then both the electron and a twin particle, the positron, have equal logical claims to existence, hence, either the physical existence of the positron can be confirmed by experiment—or the fundamental laws of quantum physics must be supplemented by an additional principle or law which will have the logical effect of excluding the possibility of a particle like the electron

A third spectacular example is Einstein's theory of relativity Then there is Einstein's equation between mass and energy, deduced as a logical consequence of the physical principles of the special theory of relativity and published as long ago as 1905, which received experimental confirmation only a few years ago—and just now in 1945 received experimental and practical confirmation on so vast a scale as to become a matter of life-and-death interest to all the people of the world

In a fundamental way mathematics is responsible for the atomic bomb We cannot thoroughly understand the all-pervasive influence of mathematics upon the advance of other branches of science and technology by fixing our attention just upon the heroic achievements Rather we must look to the more work-a-day relations, so little advertised, between mathematics and the different parts of scientific theory and practice An adequate review would require more time than we have, so a few suggestive examples will have to suffice It is, of course, in the great profession of engineering that we find the most practical and most familiar expression of modern science—and, at the same time, the commonest and most nearly indispensable applications of mathematics, particularly of its most anciently developed branches geometry, algebra, and calculus If we were to trace in detail the developments of the modern airplane, we should find it linked with the elaboration of a theory of flight, highly mathematical in character, which enables us to calculate the most useful shapes for wings, propellers, and other air-foils, and thus allows us to avoid expensive random experimentation in favor of well-directed experimental study of skillfully selected initial models

Let's glance for a moment at the science of genetics, and we see the guiding influence of mathematical statistics at work upon the detailed development of those basic principles first noted by Gregor Mendel By multiplying such illustrations we can fill in a picture in which the contributions of mathematics would be highlighted in almost every aspect of science There are inner, natural reasons why mathematics is so inextricably woven into the development of science and technology Nature, however mysterious, is at least not illogical, a principle which clearly encourages us to remain unsatisfied with mere observations upon the world about us and to proceed instead to reason about the facts established by observation The application of reason or logic to the factual material derived from observation involves us at once in the use of mathematics, which is, after all, nothing more nor less than the art of precise, formal reasoning The exhaustive study of the logical implications of the factual material of science marks out for us the limits between the possible and the impossible Nature is in harmony with logic, and thus assists us through the refinements of mathematics to concentrate the costly efforts of experimental science and technology upon those enterprises which are calculated to be most promising or advantageous

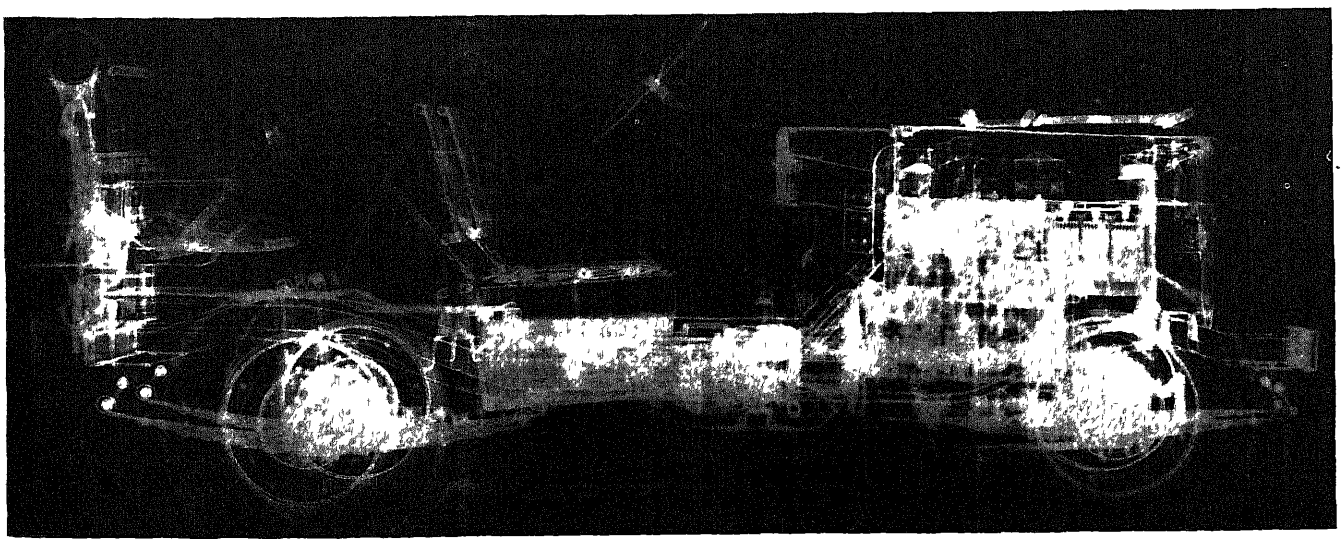
Science News Letter, March 9, 1946

MEDICINE

German Measles Danger to Unborn Babies Questioned

➤ FEAR THAT when an expectant mother has an attack of German measles, her baby may be born with cataracts, heart disease, deaf-mutism or other deformities may be relieved if further statistical studies bear out one reported in the *Journal of the American Medical Association* (March 2)

The fear arose from Australian reports, backed up by reports from American physicians, of the frequency of congenital malformations in the children when the mothers had German measles early in pregnancy. (*Turn to page 156*)



***GHOST JEEP**—This is the first radiograph of an entire automobile and was made by the Eastman Kodak Company and the University of Rochester. During a ninety-minute exposure, the X-rays had to penetrate the closed door of the laboratory, the atmosphere, and the jeep to record the image on film. The results show that almost every part of the jeep is visible, from the headlight filaments to the fuel level in the gas tank.*

AERONAUTICS

Folding-Wing Planes Save Money All Around

➤ AIRPLANES with folding wings save money for both flyers and airport operators With folding-wing planes the cost of hangar construction per plane would be cut two-thirds or more, and the number of planes which could be accommodated at a small airfield greatly increased, stated John H Geisse, assistant to the administrator for personal flying development, Civil Aeronautics Administration

A standard-type hangar 56 feet square will hold only four airplanes in individual enclosures, Mr Geisse said Yet ten planes of the same size with folding wings could be stored in the same size building, each in a separate room with generous locker and bench space The ten-plane hangar would cost the airplane operator substantially less than the present-day four-plane design, the saving being largely in the kind of doors used and in obviating the need for expensive trusses

At present there is a serious shortage of small airports in the larger cities and as private flying increases it is expected to become critical Being able to accommodate two or three times as many planes might make mid-city skyparks more attractive from an investment standpoint, Mr Geisse pointed out, in calling on manufacturers to consider incorporating folding wings in their new-design personal planes

Science News Letter, March 9, 1946

ENGINEERING

Individual Tickets Printed as Needed

➤ AIR TRAVELERS and railroad passengers will have less waiting in line when each ticket seller has a new ticket-printing machine, for his individual use, and also a series of push buttons which manipulate light flashes on a reservation board to tell him what spaces are available on a plane or in a Pullman Both devices are under experimental tryout.

The printing machine on the ticket agent's bench is easy to operate The agent sticks a two-by-two inch blank ticket into it, presses down the necessary keys, and it comes out with the starting point and destination printed It also prints the date, the agent's identification, a serial number, and the cost of the transportation and the government tax. The complete process takes but a moment Considerably less time is required than is now taken in the ordinary process of filling in the destination with a rubber stamp or pen and ink, and stamping the date on the ticket

Another advantage of the ticket-printing machine, various models of which are now being tested in use by several railroads and airways, is that it makes a permanent record at the same time that it prints a ticket At the end of his day, the ticket seller has no summary report to make up, it is all given in the machine

One airline reservation office, at least, is trying out a visual automatic space system which is cutting the time required in making reservations When a reservation is requested, the clerk presses one of the push buttons before him, and a light flashes on a large reservation board, placed where it can be seen by every reservation clerk in the room, showing what spaces, if any, are available on the particular plane desired

Science News Letter, March 9, 1946

CHEMISTRY

New, Rich Source of Vitamin C Discovered

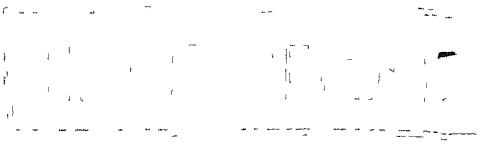
➤ A NEW, very rich source of anti-scurvy vitamin C has been discovered in the West Indian cherry Dr Conrado F Asenjo and Dr Ana Rosa Freire de Guzman, of the School of Tropical Medicine at San Juan, Puerto Rico, state that this is "one of the richest if not the richest edible fruit source" of the vitamin so far described in scientific literature (*Science*, Feb 22)

These cherries supply about 34 times as much vitamin C as oranges, it appears from the analyses of the Puerto Rican scientists which give the average vitamin C content of 100 gm of edible cherries as 1,707 mg One cherry, it seems, would supply four or more times the amount of vitamin C recommended by nutrition authorities for the day's ration of this vitamin

These cherries, commonly called acerola in Spanish, grow on small trees native to tropical and subtropical America They are fleshy, bright red when ripe and have what the scientists call "an agreeably acid taste" About six of them would weigh one ounce.

Botanists will recognize these cherries under the name, *Malpighia punicifolia L.*, and will know that in spite of their common name, they are only distantly related to the cherry family

Science News Letter, March 9, 1946



MEDICINE

Epilepsy Remedy Controls Abnormal Behavior As Well

➤ TRIDIONE, a new compound recently reported effective in controlling petit mal epilepsy, also succeeds in controlling the psychomotor attacks which some epileptics have, Dr Russell N DeJong, of the University of Michigan Medical School, reports (*Journal, American Medical Association*, March 2)

Patients with psychomotor attacks, or psychic equivalents or variants as they are also called, do not have convulsions in the attack though they may have some contortion of the trunk muscles or may stand immobile with a slow rotation of the body, Dr DeJong points out

Abnormal or automatic and sometimes violent behavior, with confusion and loss of memory for the attack, are the chief characteristics of psychomotor attacks The patient may commit crimes during an attack The seizure may last for a few minutes or many hours and the patient is usually not aware of what he is doing during an attack

Dr DeJong reports improvement, sometimes spectacular, in five cases treated with tridione The drug is taken by mouth three times a day Since most of the patients also had grand mal and petit mal attacks as well as the psychomotor ones, other drugs to control these were also needed

Science News Letter, March 9, 1946

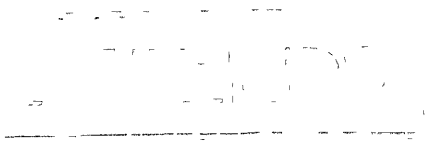
CHEMISTRY

Illinois Chemist Awarded Royal Society Medal

➤ DR ROGER ADAMS, head of the department of chemistry of the University of Illinois and chairman of the board of directors of the American Chemical Society, has been awarded the Davy Medal of the Royal Society of London for his work in organic chemistry and his recent research in the alkaloid field

Dr Adams is now in Berlin as a special adviser to Lt Gen Lucius D. Clay, deputy military governor of the American occupation zone in Germany During the war, he was in Washington with the NDRC

Science News Letter, March 9, 1946



BIOLOGY

Motherless Male Insects Produced in Laboratoy

➤ FEMALE INSECTS in the laboratory of Dr Anna R Whiting of the University of Pennsylvania have laid eggs and new male insects have hatched from the eggs—yet the females were not their mothers They had no mothers at all, only fathers

This biological paradox resulted from the treatment of the female insects, before mating, with heavy ultraviolet irradiation This destroyed or disabled the heredity-bearing chromosomes in their still-unfertilized eggs When they were subsequently mated with males and the eggs thus fertilized, nothing but male chromosomes were available to form the essential parts of the new nuclei So the new insects grew up with no trace of maternal heredity, their characters were all derived from the male parents

The insects used in Dr Whiting's experiments were tiny, gnat-sized wasps known to entomologists as *Habrobracon juglandis,* which play a useful role in orchard economy by laying their eggs in the eggs of destructive species of moths This is the first known instance of growth to full maturity of motherless individuals from irradiated eggs As much as 35 years ago, early stages in animal development from such eggs were observed, but these animals with only male parents died during larval development

This experimental production of animal forms with only the father's kind of chromosomes in their cells has been named androgenesis, which is Greek for "birth from a male"

Science News Letter, March 9 1946

ELECTRONICS

Television on Bikini Will Give Close-Ups

➤ SUCH VARIED items as goats and television will play important roles in the atom bomb tests on Navy ships at Bikini Atoll in the Marshall islands this summer, Rear Adm W H P Blandy, commander of the task force, declared

Admiral Blandy said television cameras on Bikini during the tests would give more distant observers a closer view of the experiments, while goats, pigs and sheep will be aboard the ships bombed to test biological reactions to the explosions

On Bikini, the television cameras will be placed to give a clear picture of the lagoon where the tests will be made Aboard the observing ships, the television screens will reveal closer pictures of the explosions than any observer could safely get otherwise

Tethered to the decks of the ships, the animals will be closely examined after the bombings to determine some of the possible effects of the explosions on humans The task force commander said that he regretted the necessity of using the animals, but declared that medical officers considered it essential to obtain more data on the bomb's effect on living animals, particularly in reference to shipboard conditions

Admiral Blandy revealed that extensive preparations are already underway at Bikini for the tests Minesweepers, now operating in the lagoon where the operations will be held, have destroyed 38 Japanese naval mines in the entrance, and they found five more mines washed up on one of the islands nearby Hydrographic surveys are being made, and the ships that will be bombed are being made ready at Pearl Harbor

The first test, aerial atom bombing of ships in the lagoon at Bikini, is now scheduled for May 15, while Admiral Blandy said the surface explosion will be done within four to six weeks after the first bombing

The third atomic test, exploding a bomb underwater, will definitely not be conducted until next year, he reported

Science News Letter, March 9, 1946

GENERAL SCIENCE

Pure Science Fellowships To Be Resumed

➤ FELLOWSHIPS to young scientists for work on pure science research projects in Westinghouse laboratories will be awarded in May, it is announced by the Westinghouse Electric Corporation, which is resuming a practice suspended during the war Three will be chosen The subjects of research will be left to them, and need not have direct immediate application to Westinghouse's needs

To be eligible for selection the young men must have training equivalent to that represented by a doctor's degree from a recognized university The fellowship has a value of $3,300 a year.

Science News Letter, March 9, 1946

PHYSICS

Meteorites Are Menace To Future Rocket Ships

➤ WHEN A ROCKET ship succeeds in rising into the upper atmosphere, it may have a catastrophic collision with a meteorite, warns Dr Joseph Kaplan, University of California at Los Angeles, physicist

Pointing out that the slowest meteorites speed into the earth's atmosphere at a velocity of about 30,000 miles per hour, Dr Kaplan says that a rocket ship wouldn't have much chance in event of a collision Faster meteorites, he adds, travel as fast as 180,000 miles per hour

Upwards of 75,000,000 meteorites plunge into the earth's atmosphere every day, reports the physicist, but almost all of them are vaporized by friction with the air before they can strike the earth If a rocket ship were sent into the upper atmosphere, he says, it might collide with a meteorite that had not yet vaporized

Dr Kaplan says that fortunately meteoric swarms are not very dense, with the most concentrated swarms averaging about one gram (1/30 ounce) of material in 20 cubic miles of space

Science News Letter, March 9, 1946

ELECTRONICS

Standards of Electrical Resistance Changed Little

➤ BASIC STANDARDS of electrical resistance established over ten years ago are still good to one part in a million, the National Bureau of Standards has announced

Since every measurement of energy and power made by the electrical industry depends ultimately on the correctness of the ohm and the volt, frequent comparisons are made with the group of standard resistors and standard cells maintained at the Bureau of Standards

Intercomparisons of resistance standards conducted by James L. Thomas, chief of the section on resistance measurement at the Bureau, have shown wirewound resistors he designed and constructed over a decade ago to be superior to any previously used They are so stable in value that, of a group of ten, not one had changed from the average value of the group by more than one part in a million, equivalent, to a change in linear measurement of about one foot in a distance of 200 miles

Science News Letter, March 9, 1946

RADIO

Radio Hams Are Back

Thousands of amateur radio operators are back after the war with many of their prewar shortwave bands and a new field of radio communication.

By RON ROSS

➤ HAMS ARE BACK—but these hams aren't at the butcher shop They're America's thousands of amateur radio operators who affectionately call themselves "hams"

Silenced by Pearl Harbor, amateur radio is back from the war with many of its prewar shortwave radio bands and a whole new field of radio communication open, according to latest assignments by the Federal Communications Commission

Before the war there were nearly 60,000 hams licensed in the United States "That's only the beginning," declares George Bailey, West Hartford, Conn, president of the American Radio Relay League Mr. Bailey estimates that 100,000 Americans will hold amateur radio licenses by the end of this year, and that there will be 250,000 hams operating amateur stations within five years.

Who are these amateur radio operators? The American Radio Relay League says the average ham is about 30 years old This mythical hobbyist has a 100-watt short wave station costing about $400 over a period of years He constructed his own transmitter and probably purchased his receiver from a radio manufacturer

"Ham" Qualifications

To qualify as a ham, the aspirant must be licensed by the Federal Communications Commission. Two licenses are required to operate an amateur station, one for the operator and one for the station. A would-be ham must be able to send and receive International Morse (Continental) code at a rate of 13 words per minute and demonstrate a thorough knowlege of radio.

More than half the applicants fail to get a license the first time they apply, but most of them return to pass the tests later Some precocious youngsters have passed the test as young as 8 A few years ago amateur radio was a hobby for youngsters, but the average age for the hams is now 30 years.

By frequent use of cast-offs and reference to the local junkyard, many amateurs construct their stations for as little as $25. A complete station can be built of new parts for $50 One wealthy ham could have started a commercial radio station for the $100,000 he reputedly spent as an amateur

Once licensed, the amateur has his own call letters assigned for his station Ham stations are limited to 1,000 watts power, but most of them are 100-watters

Hams have sent messages around the world with 5 to 10 watt stations, using one-fifth the power required by a home light bulb!

Through his station the amateur may make friends anywhere from a few miles to many thousands of miles distant Radio topics are the common ground on which the amateurs meet, but the most casual listener to the shortwave bands knows that ham talk is not limited to science

Radio amateurs vary, in the parlance of the hams, from the "ragchewer," who chats with familiar friends by the hour on any topic, to the "DX Hound," who conducts a continual search for new and faraway stations

Amateurs have an abbreviated language of their own, some derived from varied sources and some unique to hams "YL" refers to a "young lady" When she marries, she becomes an "XYL," and later an "OL" "OM" (for old man) is used for all male radio amateurs irrespective of age

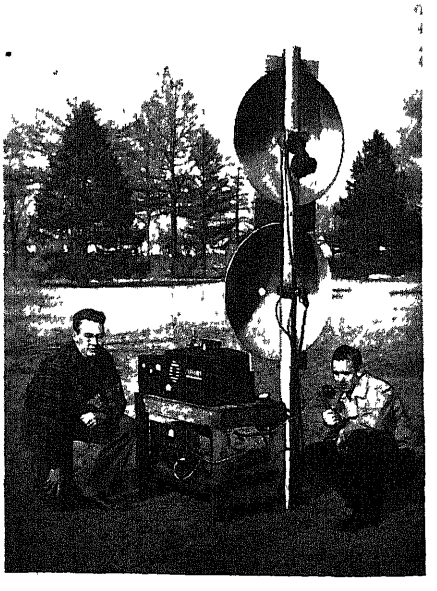
Though most ham stations are equipped to send either code or voice, an estimated 65% of the communicating is by code

The radio amateurs have a distinguished history dating back to Marconi, who regarded himself as an amateur. By 1917, America had 6,000 hams from whom to draw the nucleus of the Armed Forces radio communications staff in World War I Responding then as they were to do 25 years later, the nation's hams rendered valuable service in radio work at home and abroad.

Amateur radio expanded rapidly in the following decades, and the followers of Marconi found themselves prepared to perform an important service to the country in peace as well as war With hams operating shortwave stations in homes, garages and sheds in nearly every community in the country, it was found that they could frequently maintain contact with other areas when disaster wreaked havoc with commercial phone, wire and radio services

Thus in practically every major disaster where the forces of nature have destroyed ordinary communication lines when they have been needed most, it has been the hams who have brought aid to stricken areas Sometimes it has been a neighborhood boy "playing" with his ham station in an attic that has saved lives and brought help when floods and storms have otherwise isolated communities

In the disastrous New England flood of 1936, loss of life was negligible compared with past emergencies The authorities gave the credit for this saving of lives to the amateur radio operators who stood watch at their small transmitters during the storm Their reports of the storm and river levels and their



PIONEER "HAMS"—First amateurs to experiment with the new microwave bands, A. E. Harrison, W6BMS, Rockville Center, N. Y., and Reuben Merchant, W2LFG, Nassau, N. Y., used portable equipment to make contacts with stations 31 miles away.



"HAM" AT HOME—Member of the American Radio Relay League, William J. Halligan, W9WZE, Chicago, in this de luxe studio chats with friends around the world.

calls for food and medical aid saved many isolated areas from worse tragedy

To cope with emergencies in any part of the United States and its possessions, the amateurs now maintain an Emergency Corps of selected hams who will be able to keep up a system of intercommunication wherever the need may arise Organized by the American Radio Relay League, the Corps is made up of amateurs with portable equipment independent of local power lines who can take over when other means of communication are destroyed

The national organization of the hams, the American Radio Relay League, was founded in 1914 through the inspiration of a distinguished radio amateur of his day The late Hiram Percy Maxim, famed inventor, scientist and author, saw the need for an organized relay system among the hams to facilitate messages being sent long distances. At that time, limited ranges of shortwave transmission required a relay system. Today, when hams can send messages around the world, elaborate relay organizations are the nation's "communication insurance" in emergencies.

Pearl Harbor abruptly stopped amateur radio operations Asked to go off the air the evening of December 7, 1941, the hams quickly relayed their last prewar message and ceased operating for the duration of the war During the war the government used shortwave stations on the amateur bands

The war, fought in the laboratory and at the control panels as well as behind the guns, brought many thousands of radio amateurs into the Armed Forces and war industry. These were some of the nation's best trained personnel to cope with the problems of wartime radio and electronics—trained by building and operating their own stations

The Army and Navy eagerly sought the services of hams, finding that these men, accustomed to operating a radio station with a coil of wire, a pair of pliers and their own ingenuity, were well suited to keep sensitive equipment such as radar operating

Now back from the war, amateur radio finds some of its prewar bands still being used by the Army and Navy, but even the "DX Hound" finds regulations limiting international communicating by amateurs have been lifted

Returning, too, and eager to enter the fascinating and skilled pastime of the hams, are many thousands of men and women whom the Army and Navy have acquainted with radio and electronics during the war.

Postwar amateur radio has already entered a field opened by war-time discoveries Amateurs are now invading the super-high frequencies of radar's microwaves Limited in distance, microwave beams are narrower than ordinary waves and permit use of smaller antennas and directional equipment not practical at lower frequencies This holds promises of more private, direct beam communications using midget antennas.

In first experiments with the new frequencies, amateurs talked to each other across 31 miles on a frequency of 5,300 megacycles using an antenna less than one-half inch long

Stimulated interest in radio, plus the war-time discoveries, promise boom years for amateur radio Meanwhile, President Bailey of the American Radio Relay League looks to the future when hams will be operating their own television stations

Science News Letter, March 9, 1946

If you want to know how to become a radio ham or build an easily-constructed receiver, send two 3-cent stamps to SCIENCE NEWS LETTER, *1719 N St., NW, Washington 6, D. C., and ask for Bulletin R-10*

TECHNOLOGY

Many Opportunities For Technical Men

➤ THOUSANDS of opportunities for technical men will exist during the next years in American industry, E. C Wright of the National Tube Company told a meeting of the American Institute of Mining and Metallurgical Engineers in Chicago The demand for metallurgical engineers will continue to grow, he said, and emphasized that students in preparation for this profession need thorough training in such fundamental sciences as physics, physical chemistry, thermodynamics and mathematics.

He based his statements on experience in steel metallurgy in training graduates from various types of college courses in the plants of the company he represents He advocated a clear-cut college-industrial training program covering at least 10 years for recruiting undergraduates and graduate students each year, standard apprenticeship courses, with adequate pay rates and working hours and a training program best fitting each industry

Cooperative arrangements should be made with selected colleges, he said, to insure that apprentices be obtained from a number of different schools, and every effort should be made to mobilize undergraduates for summer and vacation work as early as possible in their college courses By these means, he predicted, the steel industry will build up a reservoir of metallurgical engineering talent.

Science News Letter, March 9, 1946

Do You Know?

Penicillin is now used in veterinary medicine

The melting point of an *organic compound* is used to identify it and determine its degree of purity

True *pheasants*, now abundant in the United States, are not indigenous to this country but are natives of Asia, especially of India and Indo-China

Menhaden is an important fish in the paint industry because its oil is used in the manufacture of insulating varnishes and ship bottom paints

Starch sponge, used in foods and absorbable surgical dressings, is made by mixing commercial starch in water, heating the mixture to form a paste and then slowly freezing the paste; when thawed it retains its sponge shape

Synthetic rubber is said to be superior to natural rubber in the printing industry for inking rollers, printing plates, press blankets, and other rubber printing materials because it resists the chemicals in ink.

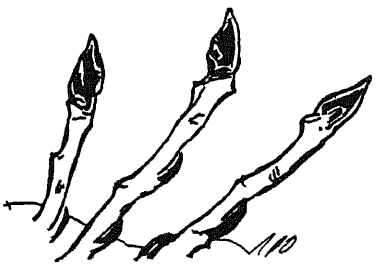
About half the qualified *psychologists* in the United States are employed normally in colleges and universities; the others are in clinics, penal and mental institutions, hospitals, government, state and other services

Quick-frozen, precooked, ready-to-serve *complete meals*, in individual cardboard plates that resist water, heat and grease, will soon be available in retail stores; 20 minutes in a hot oven and they are ready for the table

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BOTANY

NATURE RAMBLINGS by Frank Thone



Dry, But Not Warm

➤ JUST ABOUT NOW, or in a couple of weeks more at most, trees and shrubs will be unwrapping their buds and getting ready for another season of green growth The varnished scales that have enclosed them for months have served their turn and are now discarded, they litter the ground at the base of the trees

Almost inevitably, some one will liken them to garments that have kept the young leaves and flowers dry and warm all winter long and can now be shed Warm-blooded egocentrists that we are, we think of plants in human terms

We would be nearer the facts if we stopped at the halfway point in our nursery metaphor. For bud-coverings keep the buds dry—but not warm The tight-packed beginnings of leaves and flowers within the closely shingled roofs of scales become zero-cold when the outside air drops to zero Thanks to the condensed state of the little sap that is in them, resembling syrup or mucilage more than it does water, they do not actually freeze If the cold should become so intense as to cause the formation of ice crystals in the buds, their delicate tissues would be torn and burst, and they would probably die But this extreme state of affairs seldom comes to pass

The real job of the bud scales is to keep outside water out, and inside water in Wet snow may fall until every twig is "ridged inch-deep with pearl," freezing rain may sheathe all the trees and bushes with ice, but within the tight little houses of the buds the coming spring's leaves and flowers reck nothing of it The scales are waterproof so that moisture cannot penetrate; they are tenacious against outside pullings and buffetings Only the pressure of swelling new life within will serve to push them open and finally break them off

Probably even more important than their function in keeping the buds dry is their opposite task of keeping them from drying out Although the sap in over-wintering buds is considerably thicker and less watery than the sap in summer leaves, there is a limit to its tolerable concentration Evaporation can kill buds And evaporation can go on even in the coldest of winter weather some of the driest deserts in the world are cold deserts, like the Gobi, and our own Great Basin area Winter drought can be even crueller than drought in summer, for roots and stems are unable to replace evaporation losses with fresh moisture from the soil Highly essential, therefore, is the role of the bud coverings in conserving the necessary minimum of water in the unborn leaves and flowers

Science News Letter, March 9, 1946

From Page 151

It was even suggested that an abortion might be justified in case of German measles, or rubella as it is technically named, in an expectant mother

These conclusions are not justified, Dr Max J Fox and Dr Mortimer M Bortin, of Milwaukee, Wis, state They base this on investigations of cases of German measles recorded at the Milwaukee health department Among 22,226 cases reported in 1942, 1943 and 1944, eleven were expectant mothers One of these subsequently had a stillborn child and one had twins, both normal The others presumably gave birth to normal babies One gave birth to a child with congenital cataracts following a normal pregnancy, but when she had German measles while pregnant the baby was normal

A well-organized survey from other health department records should be conducted, the Milwaukee physicians advise

Science News Letter, March 9, 1946

The *drum of the ear* is only about 0 004 inch thick, yet it vibrates millions of times every day with sound waves hitting on it

Aluminum is being recovered chemically from obsolete airplanes, caustic soda dissolves out the aluminum in the scrap, leaving bolts, nuts and other foreign materials untouched and reducing the alloying metals to a sludge that may be separated out

MEDICINE

Scleroderma Weapon

A chemical closely related to vitamin D has proved successful in treating the strange hidebound condition of the skin.

➤ SUCCESSFUL treatment of scleroderma, the strange hide-bound condition of the skin sometimes seen in "the man who turned to stone" of the circus sideshows, is reported by Dr Eugene T Bernstein and Dr Lewis A Goldberger, of Mount Sinai Hospital, New York (*Journal, American Medical Association,* March 2)

A chemical closely related to vitamin D is the remedy they used The name of the chemical is dihydrotachysterol This chemical does not have the antirickets action of vitamin D, but it exerts a powerful effect on calcium utilization in the body

The cause of scleroderma is not known but in recent years scientists have found that the calcium metabolism is disturbed in this condition In some patients the amount of calcium in the skin was increased by about 30% which seems to give a good basis for the "turned to stone" description of the patients Their skin is also described as leathery, boardlike, hidebound and glistening with a characteristic ivory white sheen It cannot be picked up between finger and thumb The face looks like a mask

The patient reported by the New York physicians had an operation for thyroid gland enlargement a year before she developed scleroderma Damage during the operation to the neighboring parathyroid glands, which play an important part in regulating calcium metabolism, was suspected For this reason dihydrotachysterol was given The response was "almost dramatic," the physicians state, and her skin returned to its normal condition except for some areas of color change.

Science News Letter, March 9, 1946

ELECTRONICS

Television in the Sky

Experiments now being carried out on relay stations carried in blimps. If successful, it will give a wider television range.

➤ TELEVISION broadcasting from relay stations carried aloft in blimps is now proposed, and General Electric Company engineers in Syracuse, N Y, are experimenting with relay equipment installed in this type of lighter-than-air craft to study increased relay range of a station at varying altitudes A somewhat similar scheme is under investigation by the Westinghouse Electric Corporation, using airplanes traveling in lazy circles high above the earth

The experiments of General Electric are part of a broad program of research to determine the best methods of relaying television—a necessary step if television programs are to have wide range Direct programs from television stations rarely extend beyond the horizon, usually less than about 50 miles For wider range of television transmission through the air by radio waves, booster or relay stations are necessary Ground stations for this purpose have to be erected about 35 miles apart By the use of stations far above the surface of the earth, either in planes or blimps, the number of relays can be very much reduced, it is expected

With the use of coaxial cables, television, of course, is transmitted long distances, but this type of electric cable is expensive Radio-wave transmission will probably prove less costly provided too many relay stations do not have to be erected and maintained The Bell System will soon be in a position to make determining comparisons between coaxial transmission and transmission by ground-based relay stations with its new coaxial installation between New York and Washington, and the other between New York and Boston The value of airborne stations is a matter of future determination

If Westinghouse engineers are correct, one station in a plane slowly circling over New York at an elevation of 30,000 feet would deliver direct television radio waves to both Washington and Boston, and to the area between these cities and far to the west of New York The plane-carried relay they propose would blanket the earth's surface like a giant ice-cream cone, covering an area 422 miles across

General Electric, in its initial blimp relay tests, operated an airship over territory between Schenectady and New York It is an area where General Electric, and Globe Wireless, Ltd, will operate an experimental radio relay network The companies already have government permission to erect ground booster stations between these two cities, and also between New York and Washington

Science News Letter, March 9, 1946

Protein can be removed from peanut meal by treating it with mildly alkaline water and then acidifying the solution

Bunches, or stems, of *bananas* vary in weight from 22 to 62 pounds, with the average bunch received in the United States weighing 50 pounds

A new Russian *helicopter* of metal construction has two motors and airscrews placed on either side of the fuselage and joined to it by a metal frame

The most common and deadly *cancer* is that of the stomach, about one-half of all cases of cancer in men, and one-third of those in women, involve cancer of the stomach

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ELEMENTARY BACTERIOLOGY—Joseph E Greaves and Ethelyn O Greaves—*W B Saunders,* 613 p, tables and illus, $4, 5th ed A textbook, revised to cover recent advances including antibiotics, especially penicillin, electron microscope, new material in influenza, Rocky Mountain spotted fever, infantile paralysis, etc

FOREIGN TRADE AND SHIPPING—American Maritime Council—*McGraw,* 307 p., tables, $3. A comparison of the American and British approach in handling problems relating to foreign trade and shipping with a view to determining those steps which should be taken by government and industry to develop an effective organization for the handling of our foreign trade



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The above Micromax Recorder, shown being examined by a test engineer of the Dewey and Almy Chemical Co, is doing an important job as the measuring and controlling instrument in tests of the diverse cement ingredients the company manufactures

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HOW TO FIND AND SUCCEED IN YOUR POSTWAR JOB—Frank S Endicott—*International Textbook,* 147 p, tables and illus, $1 75 Suggestions for an individual's self-analysis, choice of vocational opportunities, satisfactory placement, and successful achievement

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THE NUTRITIONAL IMPROVEMENT OF WHITE RICE—M C Kik and R R Williams—*National Research Council,* 76 p, tables and illus, free Bulletin of the National Research Council, No 112

THE NUTRITION OF INDUSTRIAL WORKERS —*National Research Council,* 33 p., tables, free An appraisal of dietary deficiencies among industrial workers and suggestions for the development of nutrition programs

PROTECTION FOR ELECTRIC MOTORS—E S Shepardson—*N Y State College of Agriculture,* 12 p, tables and illus., 5 cents Description and use of motor overload protective devices Cornell Extension Bull 673

RADAR What Radar Is and How It Works— Orrin E Dunlap, Jr—*Harper,* 208 p, diagrs and illus, $2.50 A simple explanation for the layman

A REVIEW OF BLOAT IN RUMINANTS— *National Research Council,* 53 p, tables, 25 cents. Fourth report of the Committee on Animal Health

SCIENCE FOR YOUNG MEN—A Frederick Collins—*D. Appleton-Century,* 257 p., diagrs, $3 For those interested in entering any branch of the aviation industry, includes chapters on surveys, and maps, photography, electricity, radio, meteorology, gliders, ground work in aviation, and air navigation

THE TECHNIQUE OF THE PICTURE STORY A Practical Guide to the Production of Visual Articles—Daniel D. Mich and Edwin Eberman—*McGraw,* 239 p, illus, $3.50 Reference book for general public and free-lance writers who want to learn the goals and methods for picture-magazine publishing

WINDOW LABORATORIES—Gustave B Timmel and E L Palmer—*N. Y State College of Agriculture,* 31 p, illus., 10 cents Suggestions for the use of school room windows in nature study projects. Cornell Rural School Leaflet Vol 39, No 2.

WINGS OVER AMERICA The Future of Air Power—John Stuart—*Public Affairs Committee,* 31 p, diagrs, 10 cents Discussion of the research and development necessary to maintain our air power Public Affairs Pamphlet No 114

Science News Letter, March 9, 1946

METEOROLOGY

Weather Stations to Get Cloud Measuring Device

➤ THE CEILOMETER, a delicate electronic instrument for measuring the altitude of clouds, will soon be in operation at 140 weather stations in the United States, reported W R Thickstun, chief, instrument division, Weather Bureau, Department of Commerce

Capable of measuring the heights of clouds up to 15,000 or 20,000 feet in daylight and up to 30,000 feet at night, the new instrument was developed during the war

The ceilometer consists of two separate instruments, a powerful arc-light projector which flashes a beam of light into the sky to reflect from the base of a cloud layer, and a photo-electric cell or electronic eye mounted in a telescope-like apparatus, that picks up the reflected light beam Measurements are computed in a similar manner to that used with a mariner's sextant, with a triangle formed by the two parts of the ceilometer and the cloud layer

Science News Letter, March 9, 1946

AERONAUTICS-METEOROLOGY

All-Weather Flying Tests In Thunderstorms Planned

➤ SPECIALLY equipped fighter planes will be flown by Army Air Forces pilots in the area of Orlando, Fla, during the worst spring and summer thunderstorms

The planes will collect instrumental and photographic data on cloud forms and heights, turbulence, precipitation, lightning and temperature

Ten P-61 Black Widow night fighters will make flights to get the observations and will also test various methods of using radar to find safe paths through storm areas Army experts hope to use the information from these tests to develop flight procedure and techniques that will reduce the hazards of flying through storms, the War Department reported

Science News Letter, March 9, 1946

MEDICINE

A-BombRadiationSickness

Jap victims suffered sickness similar to that seen in patients who get sick following massive doses of X-ray or radium.

➤ JAP VICTIMS of the atomic bomb suffered "true forms of radiation sickness" similar to that seen in the United States in patients who get sick following massive doses of X-ray or radium, Comdr Joseph J Timmes, Navy medical officer, reports (*Naval Medical Bulletin*, Feb)

Comdr Timmes was one of the first American physicians to see atomic bomb patients in Japan Aboard the USS Wichita, he steamed into Nagasaki Ko on Sept 11, 33 days after the atomic bombing and about 10 days before the arrival of the various scientific commissions

Fever, a sick feeling, loss of appetite, bleeding gums and bloody diarrhea were the symptoms complained of by the average patient when first brought to the hospital for treatment of A-bomb sickness Their teeth were loosened and could easily be removed by hand Gold fillings subsequently examined contained radiant energy Many lost much of their hair but at the end of a month a few had begun to grow new, downy hair Whether the baldness will be permanent is at this time "purely speculative," Comdr Timmes states

A large percentage of the early victims, it can be assumed, died of the effects of the radiant energy released by the atomic bomb, Comdr Timmes reports

The idea that the area would continue to be dangerously radioactive, however, is dispelled by Comdr Timmes' findings

"Our first concern was the amount of radiant energy possibly remaining in the area and in the victims," he states. "X-ray film buried in the bombed area and attached to various objects about the so-called crater (a true crater does not exist) failed to reveal the presence of radioactive elements Later the other investigators, with the aid of Geiger point counters, reported the area to be safe and found only negligible amounts of radiation.

"X-ray films were then attached to the limbs of atomic victims at the hospital and kept in place for 18 hours. All of these films failed to reveal radiation, which may be explained by the fact that although these patients were exposed to forms of radiant energy they did not absorb any in large amounts"

The principal effect of the radiation on the patients was on the bone marrow Most of them suffered from an aplastic type of anemia Their blood was deficient in red cells and hemoglobin A number of patients with about a fifth or sixth the normal number of white blood cells were seen and in some cases the white cells disappeared completely before death Only a few cases of X-ray skin burns and those mild in character were seen

Many of the patients died as the result of infection attacking them after the bombing, particularly bronchopneumonia In general, the younger persons had more recuperative abilities but it was difficult to determine the prognosis in the various cases

Japanese attempts to treat the patients had been meager because most of their medical supplies had been depleted A primary school had been converted to a hospital, since the hospital and medical school of Kyushu University at Nagasaki had been destroyed The Japanese gave the patients small amounts of vitamins, liver extract and occasionally a blood transfusion

The U S Navy group had rather limited supplies for treating these patients The penicillin and plasma had "the anticipated beneficial effects"

Science News Letter, March 9, 1946

CHEMISTRY

De-Gassing Molten Metals Subject of New Patent

➤ GETTING undesirable gases out of molten metals is the problem attacked by the process on which Arthur T Cape of Columbus, Ohio, was awarded patent 2,395,458 It was already known that this could be accomplished by getting the metal into intimate contact with carbon dioxide, but previous attempts to accomplish this have not been very successful Mr Cape turns the trick by using, not gaseous carbon dioxide, but the solidified form known commonly as "dry-ice" This is submerged in the molten metal by various means, it of course vaporizes rapidly and in bubbling through the hot liquid carries off the contaminating gases

Science News Letter, March 9, 1946

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⚙ *NIGHT BINOCULARS, developed for Navy pilots and lookouts, have an exceptionally wide field of vision and a non-reflecting coating on the exposed surfaces of the glasses to permit transmission of the maximum amount of light With them the range of night vision is greatly extended*

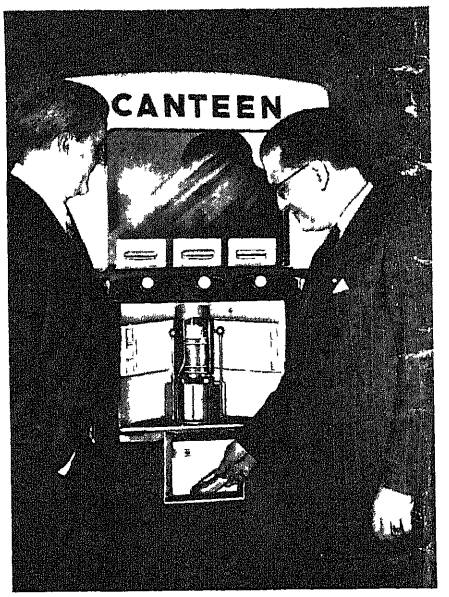
Science News Letter, March 9, 1946

⚙ *SLEEPING BERTHS rotate upward into concealment in the wall by pressing a button which operates a mechanism that works on a self-counterbalance principle. The upper berth is a complete unit, the lower is the rear of the back of a divan, either can be placed in position for use alone*

Science News Letter, March 9, 1946

⚙ *ELECTRIC pig-brooder not only keeps very young pigs warm but keeps them away from their mother, thus lessening the usual high death rate from crushing as the sow moves around It is a low shelter in the farrowing pen, heated with an overhead 100-watt lamp and reflector*

Science News Letter, March 9, 1946



⚙ *COIN MACHINES, in which "hot dogs," hamburgers and grilled cheese sandwiches within sealed wrappers are heated almost instantly by radio waves, will soon be common in public places The picture shows the mirror-topped machine with a sandwich in the electronic heating chamber and another being removed below.*

Science News Letter, March 9, 1946

⚙ *CELESTIAL sighting device, by which air and surface ship navigators may take bearings by the stars in daylight, looks like a combination telescope and surveyor's instrument Attached to the lower end of the tube of the instrument is an eyepiece turret with three eyepieces, and within the tube is a prism that bends the light rays through 90 degrees*

Science News Letter, March 9, 1946

⚙ *SNOW TRACTOR has a rhomboid-shaped frame so that its sloping front easily mounts the snow Sprocket wheels on the four corners carry the endless cleated traction belt, one wheel on each side being powered by a gasoline engine The tractor, designed to pull a dog sled, is steered from the front or rear by projecting handles*

Science News Letter, March 9 1946

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Question Box

AERONAUTICS

What advantage do folding-wing planes have? p 152

BIOLOGY

How were motherless male insects produced? p 153.

CHEMISTRY

How is "goop" being used now? p 149

What new, rich source of vitamin C has been discovered? p 152.

ENGINEERING

What was responsible for Germany's lag in rubber? p. 148

MEDICINE

How logical is the fear that German measles in expectant mothers may cause malformation in babies? p. 151

What new conquest has penicillin made? p 147

What new scleroderma weapon is offered? p 157

METALLURGY

To what uses may the new low-melting gold alloy be put? p 147

METEOROLOGY

What is the ceilometer? p 158

PHYSICS

How may meteorites menace rocket ships of the future? p 153

RADIO

What is the average age of radio "hams"? p 154

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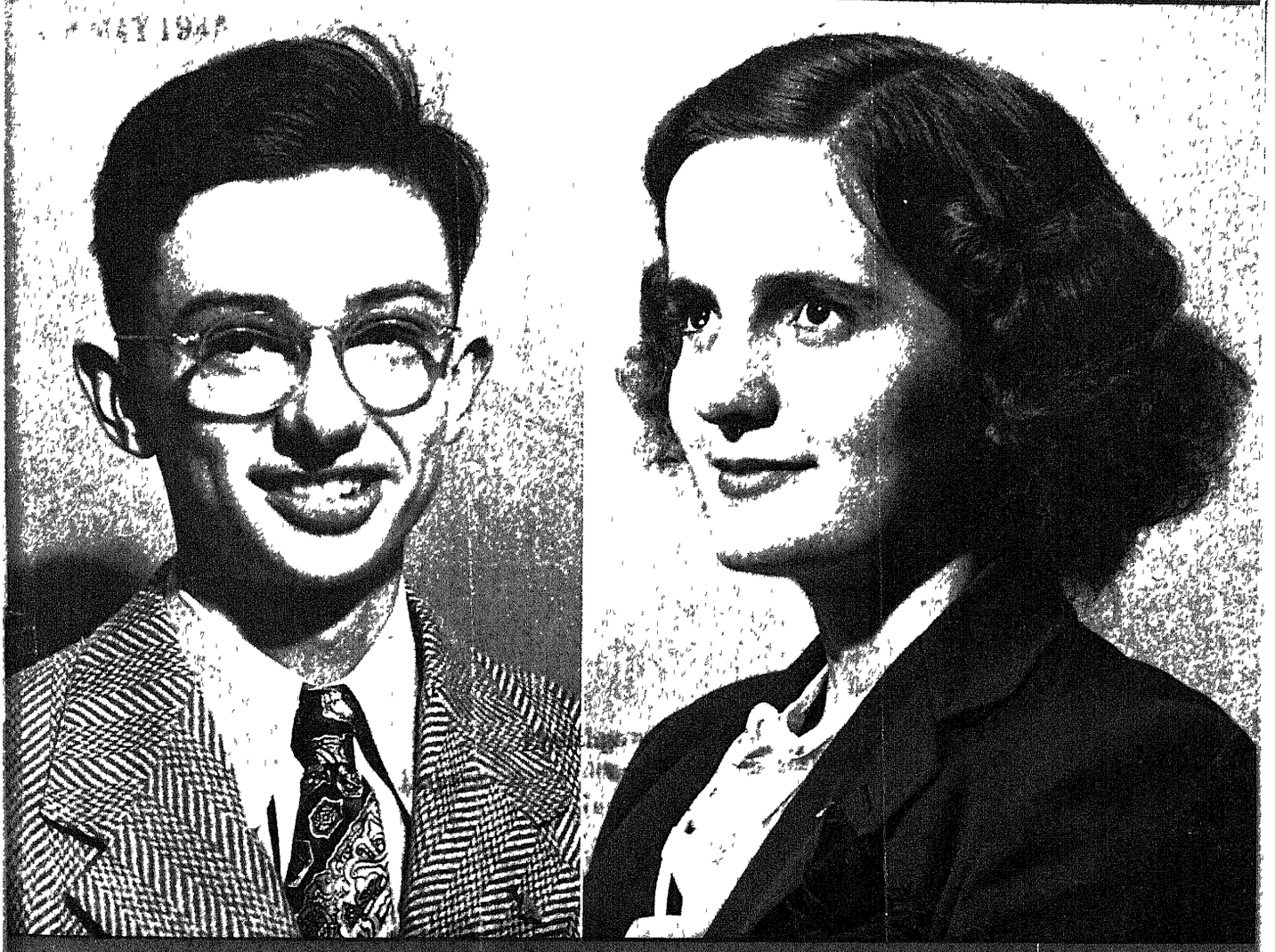
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SCIENCE NEWS LETTER

Vol. 49, No. 11

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 16, 1946



Tomorrow's Scientists

See Page 163

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1921 TWENTY-FIFTH ANNIVERSARY 1946



GENERAL SCIENCE

Science Scholarships

16-year-old "vacant lot" ecologist shares top honors in Science Talent Search with 17-year-old girl who hopes to become a brain surgeon.

See Front Cover

➤ BRAINS LITERALLY won a $2,400 college scholarship for a 17-year-old girl, while the other top Westinghouse Science Scholarship in the Fifth Annual Science Talent Search went to a 16-year-old boy, whose science studies began in a vacant lot near his home The winners are Marilyn Rohrer, 306 College Ave, Elizabethtown, Pa, and Jules Kernen, 5065 Oleatha Ave, St Louis, Mo

Portraits of the top winners are shown on the front cover of this SCIENCE NEWS LETTER

Eight other high school seniors were awarded Westinghouse Science Scholarships worth $400, while 30 received one-year $100 scholarships

Jules

Proving that science laboratories are where you find them, Jules Kernen, who won a $2,400 scholarship, made an ecological survey of a three-acre lot inside the city of St Louis in which he catalogued 245 different varieties of plants and animals in one month Medical research also interests Jules and he hopes to help find the causes of cancer In addition to his ecological survey in the vacant lot, he has experimented with white rats to study nutritional deficiencies, and has published the results of some of his work.

Marilyn

Miss Rohrer, who hopes to become a brain surgeon, boasts a collection of carefully preserved brains from such animals as squirrels and dogs and even has a human brain carefully preserved for study. Jokingly called "the brain" by her friends, her interests are not limited to science She is a "hot" trumpet fan of the Harry James school Her brain exhibit at the Science Talent Institute consisted of 33 different specimens weighing 80 pounds

Alternates to the $2,400 scholarships are two $400 winners, Josephine Raskind, 16, 108-21 70th Ave, Forest Hills, N Y, and Stephen Arnold, 17, 1128 Washington St, Oak Park, Ill, a student at Culver Military Academy

A student of embryology, Miss Raskind conducted extensive experiments with small snails

In his study of cosmic radiation by use of Geiger counting tubes, Stephen Arnold found that commercial tubes were too expensive so he built his own He plans to continue his study of high energy particles

Science News Letter, March 16, 1946

SCIENCE TALENT INSTITUTE ***—Alternates for the $2,400 scholarships are shown on the top row of the facing page: left, Stephen Arnold and right, Josephine Raskind. Center, Henry Wallace talks to a group after addressing a session of the Science Talent Institute. Second row left, Stephen Arnold, Marilyn Rohrer, Jules Kernen, and Josephine Raskind congratulate one another, Dr. Glenn T. Seaborg discusses new chemical elements with a group. The $400 scholarship winners below are: Douglas Baird, Richard Lewontin, Gordon Newkirk, Abraham Schweid, Arthur Spular and Harold Zirin. Photographs by Fremont Davis, Science Service staff photographer.***

GENERAL SCIENCE

Science and Our Future

Military operations and scientific research are two different kinds of activity, and neither should be subordinated to the other.

By DR. E. U. CONDON
Director, National Bureau of Standards

Address given before the Awards Dinner of the Fifth Annual Science Talent Institute, March 5, 1946

➤ WE ARE MET here tonight to do honor, not only to the 40 boys and girls who are the winners in the Fifth Annual Science Talent Search, but also to the thousands of boys and girls throughout our land and throughout the world, who are our hope for the scientific development of the future You 40 are bright boys and girls You are therefore intelligent enough to realize that you are fortunate You know that there are plenty more of equal promise and enthusiasm back home where you come from You know that your presence here does not mean that you are already "made" as scientists You know that it simply means that you have shown yourselves worthy of the support and encouragement which Westinghouse Science Scholarships afford.

And you know that with this support you accept a responsibility to work for maximum self development, as creative scientists and good citizens.

The future of science in the world indeed need give us no concern if in every land the boys and girls of eager intelligence comparable to yours will be sought out and given the opportunities for growth which await you I have no fears for the future if we entrust it to free, inquiring, critical minds such as yours

But, my young friends, there are quite a few of your elders gathered here tonight, and there are some things I want to say to them The people of my generation, and those who are my elders, have made quite a sorry mess of the world in which you are going to have to live I want to talk to them about some things we need to do right away—in the next few years—to make amends as best we can, while you are acquiring the background knowledge and technique with which you will make your contributions to science in the future

Millions are dead, millions more are homeless, hungry and shivering, at the end of the worst war in man's history In America we have been more fortunate, although even here we have war-born difficulties—there is, for instance, a serious shortage of women's stockings made of a particularly favored synthetic fiber!

The war's destruction far exceeds that of any catastrophe yet known. The war ended with the application of a new weapon that is a thousand times more frightful than the weapons which produced most of the war's frightfulness And already we have responsible state-

ments from scientists who made this development, that bombs a thousand times more powerful than those already used are capable of being made in the near future There are men living who know how to make a single bomb whose destructiveness is equal to a million ton-ton blockbusters One such bomb, dropped on Washington or any other major city, may be expected to wipe out its population, to destroy its buildings utterly, and to render the site uninhabitable due to poisoning by radioactive materials

In the face of this situation, people react essentially in one of two ways The first kind say "It's just another weapon Mankind learned to adapt to the long bow, and the cross bow, and the B-29 We have always had wars" An extreme expression of this kind is found in a speech by Prof Leslie A White of the anthropology department of the University of Michigan, delivered in Philadelphia last December He says, "As for the extermination of the human race as a consequence of hurling atomic thunderbolts, this too may be admitted as a possibility, and all we can say is that if it is to come it will come" This is indeed a rather coldly hopeless, fatalistic expression Prof White further says, "Extravagant expressions of horror will not alter the course of events."

There is a certain rhetorical trick here in that in our language, "extravagant" connotes exaggeratedly inaccurate and thus emotionally detracts from the serious warnings which responsible physicists are trying to give us Now I would agree that expressions of horror *alone* will not alter the course of events But I insist that if we look at what civilization has suffered in World War II, even before the atom bomb, and couple it with the picture of a war with plentiful use of the old-fashioned one hoss shay atom bombs, and further with the picture of a war with both sides equipped with the really potent 1950 models—then, I say, no expression of horror of which our hearts are capable can be exaggerated or extravagant I say we need not and should not fatalistically await death, reading papers to an academic society, meeting in a museum in Philadelphia.

The second kind of people react differently We say, this is the end. Mankind has brought down suffering and death on its head, spiritual values have been destroyed, hatreds have been nourished and developed into great social cancers by war, and the war fears, and the war suspicions and divisions among men.

This has been going on since the beginning of time and will surely destroy us all if we let it continue This second kind of people say simply that this must stop We say there is such a thing as progress toward a higher level of development With all the stumbling and fumbling, we see an upward trend throughout human history We read the lesson of history to be that men can go forward together, and that men can progress to new freedoms, and new areas of social adjustment

We see that man's growing mastery over the forces of nature also serves to amplify the magnitude of the social crises which confront him Centuries ago, wars were local affairs However, terrible, they affected only relatively small sectors of civilization. But the last two major wars were world wars in a true sense Their damage literally affected everyone We face a situation in which a future world war, employing atom bombs, in rockets guided by radio, and many other marvels of man's perverted ingenuity, will achieve a destructiveness thousands of times greater than ever achieved before The magnitude of the crisis is such that we must soberly think of the choice as being between drifting into a war which will lead to the destruction of civilization, leaving a remnant of stunned, confused, poverty-stricken, frightened men and women amid the ruins,—or a wholesome healthy development of a united mankind, using its intelligence cooperatively for the good of all

I beg of you, cast in your lot with the persons of the second kind—the people who believe there is a possibility that men throughout the world can live in freedom and justice, in love and goodwill, that they can devote their full energies to constructive application of the rational thinking to call science to the arts of peace In asking you to join with us, I make no promise of certain security I only promise hope, and tell you that the other way leads to certain doom If we try to establish the brotherhood of man on earth we may fail, but if we do not even try we shall surely fail, and what an unbearable load of guilt our consciences will then have to carry

So much for the generalities of the situation in which we find ourselves Now, if I may, I would like to comment a little more specifically on the immediate choices which lie before us.

We must assert ourselves in every kind of agency of world cooperation toward positive wholesome working together for human welfare This means the fullest kind of active support to the efforts of peoples everywhere to go forward, in political and economic freedom, to the highest level of educational, scientific and cultural achievement This means specifically support to UNO, UNRRA, and UNESCO and whatever other such activities lie ahead

We must particularly seek to bring about closer working relationships with our friends and allies, the Russians Russia and the United States are today the most powerful nations in the world so unless we can get along together, there is no hope for peace We must seek to recapture something of the feeling of joy and pride we had in being on their side, after Stalingrad and during their long, arduous drive to push the Nazi war machine out of their devastated lands We must welcome their scientists to our

SCIENCE NEWS LETTER

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Westinghouse Science Scholarship Winners

GRAND SCHOLARSHIPS OF $2,400

Rohrer, E Marilyn, Elizabethtown, Pa
Kernen, Jules Alfred, St Louis, Mo

ALTERNATES

Raskind, Josephine Baron, Forest Hills, N Y
Arnold, Stephen Reynolds, Culver, Ind

SCHOLARSHIPS OF $400

Raskind, Josephine Baron, Forest Hills, N Y
Arnold, Stephen Reynolds, Culver, Ind
Baird, Douglas Page, Whitesboro, N Y
Lewontin, Richard Charles, Forest Hills, N Y
Newkirk, Gordon Allen, Jr, West Orange, N J
Schweid, Abraham Isaac, New York, N Y
Sicular, Arthur, New York, N Y
Zirin, Harold, Bridgeport, Conn

ALTERNATES

Roemer, Elizabeth, Alameda, Calif
Hummel, James Alexander, Los Angeles, Calif
Gall, Walter George, Garfield, N J

SCHOLARSHIPS OF $100

Jackson, Dorothy Jean, South Charleston, W Va
Jones, Elaine Carlota, Mill Valley, Calif
Karasz, Ilonka, St Albans, N Y
Kingman, Alice May, Eugene, Oreg
Kohnen, Dorothy Margaret, Chicago, Ill
Laufer, Elizabeth Ursula, Villanova, Pa
Lines, Joan Louise, Syracuse, N Y
McMillin, Patricia Ruth, Boulder, Colo
Roemer, Elizabeth, Alameda, Calif
Bush, Leon Reginald, New York, N Y
Champeny, John Charles, Wellington, Kans
Cudaback, David Dill, Napa, Calif
Cumming, James Burton, St Albans, N Y
Durell, Jack, New York, N Y
Gaines, George Loweree, Jr, Hamden, Conn
Gall, Walter George, Garfield, N J
Gibson, James Benjamin, Ellensburg, Wash
Herbert, Donald Edmonds, Jr, Tulsa, Okla
Hopkins, John Taylor, IV, Washington, D C
Hummel, James Alexander, Los Angeles, Calif
Johnson, Russell Dee, Jr, Granite City, Ill
Kindig, Neal Bert, Medicine Lodge, Kans
Larson, Daniel Herbert, Downers Grove, Ill
Ludwig, Gerald Wilbur, New York, N Y
Sack, Seymour, Poughkeepsie, N Y
Seely, Gilbert Randall, Blaine, Wash
Shields, James William, San Francisco, Calif
Shombert, Donald James, Pittsburgh, Pa
West, Robert C, Jr, Upper Montclair, N J
Widing, Kenneth Gordon, Brainerd, Minn
Judges Dr Steuart Henderson Britt, Dr Rex E Buxton, Mr Watson Davis, Dr Harold A Edgerton

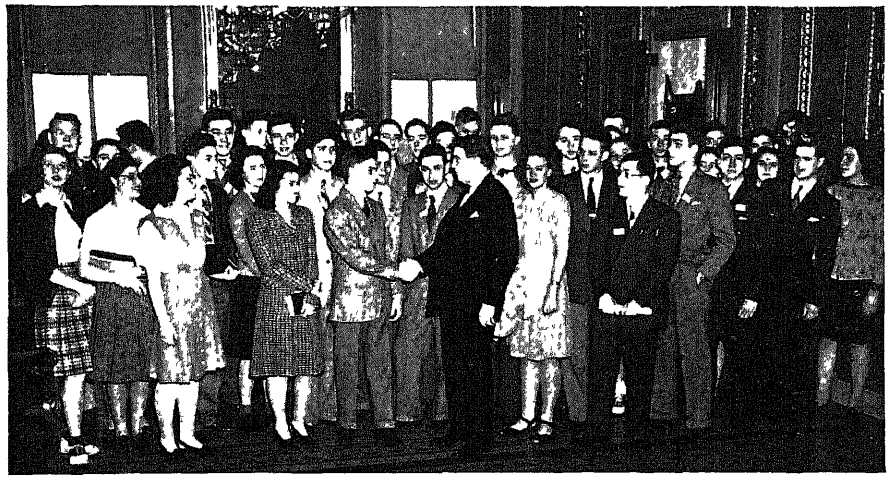
laboratories, as they have welcomed ours to theirs, and extend the base of scientific cooperation with this great people. Of course we must behave this way toward the scientists of all nations—I only mention Russia because she is right now the target of attack by those irresponsibles who think she would be a suitable adversary in the next world war.

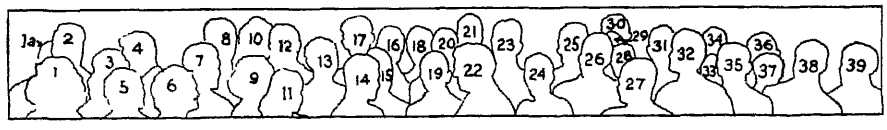
We must regain for all scientists that freedom from military domination which is so necessary if science is to be used for peaceful ends With Nazism not wholly exterminated, we must have scientists contributing to the development of our tools of war, since, God forbid, we may, if all else fails, have to use them But the scientific life of the country must not be subordinated to, nor derive its chief support from, the military

This is essential in the interests of the military themselves Because the scientific spirit is so completely opposite to the military spirit, science simply will not go forward under domination Nowadays men must work together in large organizations It is characteristic of the military organizations that operations are planned and directed from the top, with the details executed by men below, by persons who unquestioningly and obediently respond to the orders given them from above The flow of original thinking is from the top to the bottom I conceive just the opposite to be true in a properly administered scientific organization The function of a scientific director is to set up working conditions where the lowliest novitiate is put in touch with all the problems in his field and encouraged to worry about them and to come out creatively with new ideas and results He is the sole judge of what knowledge he needs in order to work effectively on his problem The flow of original thinking in this case is mainly from the bottom to the top

Every worker must have access to the whole story because no one can foresee which scientist will have the truly creative idea And each scientist must be free to discuss his ideas, while in the formative state, with his colleagues anywhere, for it is from the working together of many minds that new science comes

In contrasting the military and scientific, I do not wish to imply that one is wholly wrong and the other wholly right Just as I do not recommend the military procedure for the conduct of scientific research, neither would I want our safety to depend on the outcome of a battle in which the scientific method of free discussion, independent thinking and mutual criticism was followed by all the captains and lieutenants on the battlefield Military operations and scien-





VISIT TO CAPITOL—The group of winners met the President of the Senate, Hon. Kenneth McKellar. They are: 1 Kingman, 1a Widing, 2 Herbert, 3 Raskind, 4 Durell, 5 Roemer, 6 Kohnen, 7 Gaines, 8 Zirin, 9 McMillin, 10 Hopkins, 11 Karasz, 12 Champeny, 13 Lewontin, 14 Newkirk, 15 Larson, 16 Bush, 17 Cudaback, 18 West, 19 Sack, 20 Sicular, 21 Johnson, 22 Hon. McKellar, 23 Shields, 24 Jones, 25 Baird, 26 Hummel, 27 Schweid, 28 Lines, 29 Shombert, 30 Seely, 31 Ludwig, 32 Arnold, 33 Rohrer, 34 Kerner, 35 Cumming, 36 Gall, 37 Laufer, 38 Gibson, 39 Jackson.

tific research are two quite different kinds of human activity and neither should be subordinated to the other.

Of course my reason for stressing this point is that right now we are confronted in America with a situation in which scientists are being held very strictly under military domination, to the severe detriment of our scientific development and the development of wholesome international relations

What is going on? Prominent scientists are denied the privilege of traveling abroad Physicists are not allowed to discuss certain areas of their science with each other, even as between individuals working on closely related phases of the same subject They can only communicate through official channels, involving censorship of their communications by army officers without knowledge and so without competence Information essential to understanding is being denied to students in our universities, so that, if this situation were to continue, the young students we honor here tonight will get from their professors only a watered-down army-approved version of the laws of nature.

In this connection one is reminded of the Holy Scriptures, where in the 18th verse of the 8th chapter of Ecclesiastes we read,

"Wisdom is better than weapons of war, but one sinner destroyeth much good"

The laws of nature, some seem to think, are ours exclusively, and that we can keep others from learning by locking up what we have learned in the laboratory and not telling it to our allies Later they will learn what we know and more besides, which because of our unfriendly behavior, we cannot expect them to tell us. In the course of time, because of such provocations, we are allies no more—we start as friends and end as snarling, suspicious neighbors.

It is sinister indeed how one evil step leads to another Having created an air of suspicion and mistrust, there will be persons among us who think other nations can know nothing except what is learned by espionage. So, when other countries make atom bombs, perhaps much better than those we have, these persons will cry "Treason" at our scientists, for they will find it inconceivable that another country could make a bomb in any other way except by aid from Americans.

Let us cast this isolationist, chauvinist poison from our minds before we corrode our hearts and arouse suspicions of our motives in the minds of the decent peoples of the world Let us cooperate wholeheartedly with the other nations of the world to agree to use atomic energy only for peaceful purposes and to set up an inspection system to enforce such agreement The United Nations Assembly has unanimously voted to establish an Atomic Energy Commission to draw up such a plan In the face of the frightfulness of atomic warfare, it is inconceivable to me that any nation will refuse to participate in a program of international cooperation and inspection Yet, much public discussion, and even more private conversation, is based upon the assumption of such a refusal We must push forward with all possible speed in order to find out where we stand in the world today so that it is no longer possible for different groups and different nations to base their thinking and their planning upon different hypotheses I am confident that if we do this the outcome will be world friendship and cooperation, and not atomic war and the destruction of civilization

In closing I would like again to quote Scripture, this time the New Testament, 17th verse of the 8th chapter of Luke

"For nothing is secret, that shall not be made manifest, neither anything hid that shall not be made known and come abroad"

Finally, I want to read to you from a poem by Elizabeth Barret Browning, called "The Truth Is Whole":

"Use is the aim of Science! give again
A golden sentence to the faithful pen—
Dwell not on parts! For parts contract the mind,
And knowledge still is useless when confined,
The yearning soul, enclosed in narrow bound
May be ingenious, but is ne'er profound
Spoiled of its strength, the fettered thought grows tame,
And want of air extinguishes the flame!"

My young friends, do not be depressed by my remarks Go on, work hard, enjoy to the fullest the expanding view and the communion with nature which your study of science will bring—the while, I hope, we others shall join together in healing war's wounds, and making the kind of world in which your talents can have free play to develop wholesome applications to human welfare for all the peoples of the world.

"The investigation which I conducted was manifestly of a preliminary nature, as it was impossible for me to study completely the hundreds of species of organisms found within the area Nevertheless, I have proved that all of the axioms of bio-ecology can be demonstrated from the intensive study of an area no larger than three acres In addition, I have learned the characteristic features of the flora and fauna to be found near my home Finally, I have gained a clear conception of the method that can be utilized by the entomologist, parasitologist, or bacteriologist in conquering our numerous organic foes, such as certain species of insects and bacteria Perhaps it is too optimistic to hope that, some day, man, aided by the knowledge gained from ecological studies, will be capable of eradicating all of the insects that devour his crops and transmit disease from organism to organism Yet who is able to say what the scientist of tomorrow will be able to accomplish when we contemplate the recent unleashing of atomic energy?"—From the essay of Jules Alfred Kernen

"The value of anesthetics to mankind cannot be overestimated Besides making possible the wonders of modern surgery, they have enabled biochemists to use lower animals in the study of diseases and methods of surgery Since the introduction of ether by Dr. Crawford Long, of Jefferson, Georgia, in 1842, scientists have been searching for the perfect anesthetic I believe a great step forward was made toward this end when our scientists discovered the modern anesthetic, intravenous pentothal sodium, a barbituric acid derivative

"My interest in this anesthetic is a direct result of my detailed study in the past year of all types of anesthetics This study itself was in conjunction with my intense desire to study brain surgery, a desire I have had as far back as I can remember"—From the essay of E Marilyn Rohrer.

Nylon fabrics are improved in handle and appearance by heat treatment, they become softer and more mellow

When the high-frequency *ultraviolet energy* of a low-pressure mercury arc, such as that inside a fluorescent lamp, is used for killing bacteria and fungi it is called germicidal radiation.

PHYSICS

Birth Of Atom Splitting

First evidence that atoms can break apart was discovery of natural radioactivity and spontaneous change of radium into uranium and thence into lead.

➤ EVEN NINETEENTH-CENTURY physics and chemistry, which regarded atoms as solid, unsplittable little lumps of unchangeable matter, provided hints that eventually gave the world an entirely different picture of the atom and led the way to its explosion into energy, with most dramatic demonstration in the atomic bomb, Dr Lise Meitner, visiting professor of physics at the Catholic University of America, told 40 finalists in the Fifth Annual Science Talent Search

German-born Dr Meitner, whose permanent post now is with the Royal Swedish Academy of Sciences in Stockholm, pointed out that as soon as the Russian chemist Mendeleef had arranged the elements according to their atomic weights in his classic periodic table, the rhythmic recurrences of numerical relations between and within the various groups suggested that atoms were not simple, indivisible particles but that they had a composite structure, being made up of still smaller particles that we have since come to know as electrons, protons and neutrons The many bright lines in the spectra given off by elements when heated provided another hint of the probable complexity of atomic structure

First solid evidence that atoms can break apart, and that in so doing they become atoms of another element, was provided by the discovery of natural radioactivity, and the spontaneous change of radium into uranium and thence into lead, at about the turn of the century At the same time, the theoretical work of such scientists as Bohr and Einstein strengthened the indication that all atoms are made of separate particles, and that if attacked in the right way they can be broken in pieces

This stimulated the rising generation of physicists in their efforts to achieve in the laboratory the effects that had been shown as theoretically possible First attempts resulted simply in the peeling off of some of the outside electrons from atoms Later, the tight little nucleus itself, at the heart of the atom, was torn apart Dr Meitner's own work was of key importance in this, since she was the first to offer an explanation of the relatively huge release of energy resulting from the disruption of the atomic nucleus

From this explanation, other physicists proceeded to work toward material and practical application First result, under the spur of wartime necessity, was the terrible atomic bomb The future may see a more gradual and ordered release of atomic energy in fuelless power plants

Science News Letter, March 16, 1946

MEDICINE

Young Scientists Asked To Develop Antibiotics

➤ THE NATION'S most scientifically talented high school boys and girls were given the mission of finding new remedies like penicillin and the sulfa drugs for conquering infantile paralysis, influenza, the common cold and other still-unconquered virus-caused diseases

The boys and girls are the 40 winners of the Fifth Annual Science Talent Search Their life-saving mission was given them by Dr Selman A Waksman, of Rutgers University and the New Jersey State Agricultural Experiment Station, who, with his colleagues at these institutions, discovered streptomycin, new and powerful ally of penicillin in disease fighting

Speaking at the Fifth Annual Science Talent Institute, Dr Waksman said

"Although many infections, notably those caused by viruses, still remain uncontrollable, the hope exists that sooner or later these will come under control

"It is to you, the scientists of the future, that we are all looking to enlarge your knowledge, to discover new scientific principles, and to apply those already known to improving the health and the very life of man"

Science News Letter, March 16, 1946

Succulent plants, particularly lilacs, and certain cut flowers can be kept fresh and in a crisp condition for many extra hours by a vacuum treatment in which air in the plant tissues is replaced by water

The *marabu,* a troublesome 12-foot shrub of Cuba, that overruns thousands of acres of agricultural land, has two points in its favor it makes excellent charcoal and is a soil-builder because it is a legume with soil bacteria on its roots



FURTHER EXPLANATION—Dr. Meitner, surrounded by a group of eager boys and girls, winners in the Fifth Annual Science Talent Search, discusses the structure of matter after her talk before a session of the Science Talent Institute. (Left to right: Hummel, Meitner, Karasz, Gibson, Arnold, Gaines.)

CHEMISTRY

All-Wool Suits For Hot Weather

➤ ALL-WOOL suits for hot weather, and warmer winter wool suits of lighter weight than present clothing, are predicted by use of a new textile chemical which also controls shrinkage and gives long-lived creases in the trousers The chemical, a development of the Monsanto Chemical Company in St Louis, held shrinkage to less than 2% after five washings of a treated wool shirt in soap and water

Wool yarn, treated with the chemical which will be known as Resloom, is capable of imparting "extreme coolness" to woolen textiles because it stabilizes the wool fiber so that it can be woven into an extremely thin yet highly serviceable fabric, the company claims At the same time, it imparts smoothness and flatness to the cloth, instead of the hill-and-valley contours of ordinary woolen weaves. A year may elapse before the new wool suits are on the market

The same stabilizing influences will enable wool processors to make winter suits of lighter weight and greater strength, it is stated This will involve increasing the thickness dimension of the cloth and decreasing the amount of wool actually used without sacrificing strength, style and serviceability

Resloom is a melamine-formaldehyde resin used to impregnate the tiny hollows of individual fibers, imparting shrinkage control, stability, wrinkle resistance, and crease retention It can be applied on existing mill equipment It can also be used with rayon and cotton To them, it gives a superior finish and, a company scientist states, "makes possible a dress which does not bulge in the wrong places after it has been worn a few times."

Science News Letter, March 16 1946

ENGINEERING

Peat Processing Machine Perfected in Sweden

➤ A PEAT PROCESSING machine, perfected in Sweden where considerable peat is used as fuel, is reported by the U S. Department of Commerce (*Foreign Commerce Weekly,* Feb 9) The machine produces hard tubular sections of compressed peat. They do not absorb water, and remain dry so that they can be transported, stored and burned without crumbling. The peat tubes can be handled like coke.

The machine, weighing one ton, is easily portable and is used adjacent to the peat beds The wet peat is pulped to a uniform mixture The machine presses the pulp through a nozzle which forms it into tubular sections which are air-dried for two weeks The moisture content is then about 20%, and the peat ready to be used as fuel Further storage under roof reduces the moisture content to about 15%

These peat tubes, prepared at a reasonable cost, burn well because of the air circulating through and around them They burn, also, without the detrimental formation of tars, and without waste through the grates due to crumbling

Science News Letter, March 16, 1946

ETHNOLOGY

Study of Ancient People Who Fought "Nazis" Honored

➤ FOR HIS study of an ancient people who successfully fought off the Nazis of their time, Boris Piotrovsky has been awarded the Stalin Prize

Mr Piotrovsky's book, The History and Culture of Urartu, summarizes many years of work by Soviet historians and philologists on an ancient civilization in the territory of modern Armenia about the thirteenth century B C

The Land of Urartu, a powerful kingdom of more than 30 centuries ago, was an important civilization in the Trans-Caucasus area, and the prize-winning book relates the successful struggle of the people of Urartu against the Assyrians who tried to dominate the civilizations of the ancient world

Science News Letter, March 16, 1946

CHEMISTRY

Three Plants to Produce Anhydrous Ammonia

➤ THREE PLANTS that produced anhydrous ammonia for Army Ordnance use during the war have been turned to civilian production of the critical material, needed for fertilizer manufacture, the War Department has announced

Army Ordnance plants in Ohio, Kansas and Arkansas will supply 4,000 tons of anhydrous ammonia per month for fertilizer production to help relieve the shortage

It was also reported that Army Ordnance has sold an excess supply of 35,000 tons of anhydrous ammonia through the Office of Defense Supplies since V-J day

Science News Letter, March 16, 1946

IN SCIENCE

MEDICINE

Ice Bag on Arm Used In Penicillin Injections

➤ A NEW METHOD of giving penicillin, with an ice bag on the arm for two hours before the injection, is reported by Lt Comdr Max Trumper and Comdr Gershom J Thompson, of the National Naval Medical Center, Bethesda, Md (*Journal, American Medical Association,* Mar 9)

The object of the ice bag is to chill the tissues and slow blood circulation so that the penicillin will be absorbed more slowly and its action will be prolonged

Patients will be pleased with this method of giving penicillin because it makes the injection, or "shot", painless, and reduces the number of times the penicillin must be given In uncomplicated gonorrhea, in which the new method was tried, the penicillin was all given in one dose, instead of in four or more as has been customary

The cure rate, 91%, when 100,000 units of penicillin was given in the single dose, compares favorably, the Navy doctors report, with the cure rate when penicillin is given by other schedules or in mixtures of beeswax and peanut oil to delay absorption

Science News Letter, March 16, 1946

ENGINEERING

Jordan Valley Development Planned by Engineer

➤ JORDAN river water, to redeem the desert land along much of the river's course, flows closer to realization of a vision of modern prophets with the departure for Palestine of John Lucian Savage, who made the plans for Boulder and Grand Coulee dams, and more recently outlined an ambitious project for taming China's terrible Yangtse river and putting its waters to useful work

Mr Savage, until recently chief designing engineer for the U S Bureau of Reclamation and now on loan to the State Department, will appear before the Anglo-American Commission in Jerusalem, to discuss the technical details of a plan for developing the water resources in the Holy Land, to produce power as well as to irrigate arid lands in the Jordan valley.

Science News Letter, March 16, 1946

E FIELDS

PHOTOGRAPHY

New Photographic Printing Papers Now Available

➤ NEW PHOTOGRAPHIC printing papers now available will save amateurs hours of wearisome waiting in the darkroom and enable professionals to do high-quality rush jobs

The new papers shed water duck-fashion because the base is impregnated with an acetate which practically waterproofs it Only one minute is needed for developing the prints, two minutes for fixing and four minutes for washing them In a smooth, white finish, the papers are offered in both contact and projection printing types

The papers were produced by the Research Laboratories of the Eastman Kodak Company to meet needs of the Army and Navy Air Forces Because in addition to speed the Armed Forces demanded papers which would not stretch, shrink or swell, industrial and commercial photographers now have paper which can be used for exacting copy and reproduction work

Science News Letter, March 16, 1946

ENGINEERING

Paper Houses May Help Solve Housing Problem

➤ PAPER HOMES may help solve the nation's tremendous demand for low-cost permanent houses that can be built in a short time

Recent experiments by the Consolidated Water Power and Paper Company, of Wisconsin Rapids, Wis, have resulted in a paper plastic building material known as Consoweld, which is said to be stronger and more fire-resistant than wood and more enduring in some respects than steel, although it is comparable in weight to aluminum

A sample three-room cottage, built almost entirely of this material, has been set up for tests Except for a simple concrete foundation, the entire building was carried to its location on a single truck, including walls, ceilings, partitions, stove, sink, icebox, oil heater and plumbing fixtures, and was set up in a small fraction of the time needed to build a three-room cottage of conventional type

The firm has also designed a "packaged bathroom," complete with walls and plumbing fixtures, which may enable rural dwellers to acquire modern conveniences by simply ordering a complete bathroom which will come to them in one carton

Consoweld consists of two thin panels of hard, compressed paper impregnated with resin and held apart by wood strips The space between the panels is filled with a fuzzy gray corrugated paper core, which insulates and soundproofs walls and doors

Officials of the company state that they are not in a hurry to place their new product on the market, because they want to be certain that it is "just right" when they do They are in the process of establishing specifications, they say, and these are not yet available for publication

Science News Letter, March 16, 1946

AERONAUTICS

Hydraulic Catapults Used To Launch Carrier Planes

➤ HYDRAULIC catapults on the flat decks of aircraft carriers enabled American planes to get into the air faster than the enemy's aircraft, the Navy has revealed

One of the Navy's most carefully guarded war secrets, the hydraulic catapult system launched planes from flat decks with more speed and under less favorable wind conditions than the more cumbersome equipment previously used

The hydraulic catapult permitted the operation of 40% more planes by carriers, made night take-offs safe, allowed carrier forces to carry on full scale operations at sea for extended periods and made our carrier force the most potent in the world, the Navy said

Used in the aircraft carrier war in the Pacific and by escort carriers in the anti-submarine patrol of the Atlantic, the hydraulic catapult allowed planes to be launched with other planes in position on the flight deck This spotting of planes made possible take-offs at an average time interval of 30 seconds aboard escort carriers with much smaller flight decks than the larger units had

The secret of how our large carriers operated for long periods at sea was hidden in the hydraulic catapults aboard the CVE's (carrier escorts). By using the catapults, these smaller ships were able to carry twice as many replacement planes to the fleet carriers as they could have otherwise.

Science News Letter, March 16, 1946

AERONAUTICS

Combination Gas Turbine Engine for Transports

➤ COMBINATION gas turbine engines that drive conventional propellers and also furnish jet-propulsion will power new transport planes under order by the United States Air Lines with the Glenn L. Martin Company These new coast-to-coast airliners, which will be ready for use during 1947, will have a top speed of around 385 miles an hour and a cruising speed of 365 miles, it is expected

The engine to be used is a General Electric turbine It burns kerosene or other low-cost fuel instead of the high-octane gasoline used in conventional engines in present airliners In addition, these engines have narrower nacelles than conventional engines, thus decreasing the air resistance. Fuel consumption of the combination engine will be approximately one mile per gallon, as against one and one-half miles per gallon with conventional engines, but the speed will be much greater, thus making fuel cost substantially lower

Science News Letter, March 16, 1946

AERONAUTICS

Door Cracks in Planes Literally Frozen Shut

➤ AIRPLANES of the probably near future, that will cruise the thin, cold air of the substratosphere, will need something to make a tight seal around doors and other necessary openings, so that the precious pressurized, warmed air in their cabins will not leak out. The idea of Warren A Custer of Newton, Pa, is literally to freeze such cracks shut with a substance that is liquid at ordinary ground-level cold temperatures but that freezes at the 67 degrees below zero Fahrenheit encountered at high-level cruising altitudes On this he has been granted U. S patent 2,395,852.

While the patent covers any substance that will accomplish this end, the one which Mr. Custer concretely proposes is based on a mixture of dibutyl phthalate and wet nitro-cotton, to which other ingredients may be added if desired An oily liquid at ordinary temperatures, it solidifies in subzero cold, clinging tightly to the solid surfaces to which it has been applied. When it is frozen it behaves like thick grease or wax, with a certain amount of "give," instead of being rigid and brittle like ice

Science News Letter, March 16, 1946

GENERAL SCIENCE-EDUCATION

Science Talent Problems

The number of veterans returning to college for further scientific training is not as great as supposed. We must assure higher education for our ablest youth.

By DR. M. H. TRYTTEN

Director, Office of Scientific Personnel of the National Research Council

Address given before the Educational Conference of the Fifth Annual Science Talent Institute, March 5, 1946

➤ I AM SURE that any one who has ever been a teacher can understand my pleasure at being privileged to speak about the brilliant group of scientific quiz kids who represent this year's winners of the Science Talent Search People sometimes wonder what it is that keeps teachers in the profession when it would be in most cases easy to secure less exacting and more remunerative employment I think it is wholly the real human satisfaction in helping in the development of minds such as these There is no thrill quite like that of seeing your students grow into able, useful and successful working members of their profession It is the promise of that, I believe, which gives us all joy in these young people today

I think that at no other time has the Science Talent Search seemed so significant or symbolic We have just finished a war in which science was not only dominant but decisive I have often thought how interesting it would be if we could set up some kind of balance sheet to measure in terms of manpower the contributions of science in this war Let us suppose, for example, that some supernatural being had come to our leaders in 1941 and taken them to a high place from where they could have seen the whole remaining course of the war in clear perspective. Suppose this being had then stated that he was going to remove all the radar developments of the next years from the picture but that he would in recompense grant the equivalent manpower supply to balance How many men do you suppose would have been necessary? Take for example the radar fire control equipment which more than any factor gave us an overpowering advantage in naval combat Or the navigation aids which made maneuvering at night at high speeds possible Or the radar antiaircraft equipment, or the plane and ship and submarine locators, or dozens of other instruments which gave us such an astonishing advantage in almost all phases of combat I think our leaders would have simply said there is no measurable equivalent. Because not only is there the brilliant performance of the present but the rich promise of uncounted years in the future Hundreds of thousands of men mean little against such power And then what of the manpower equivalent of the proximity fuze? or DDT? or of anti-malarials? or of the atomic bomb?

The question may seem a bit fantastic, and yet it is not as the following example will show In the winter of 1943-44 the Manhattan District project found it necessary to expand its activities enormuosly to meet the challenge of the race against time They needed great additions of scientific manpower It was evident, however, that there was no supply of manpower in reserve Throughout the war our policies did not permit of manpower reserves A man was either indispensable to an essential project at the moment or he was inducted As a result there appeared to be no available source of men However, it happened that in the recruitment throughout the army of candidates for the ASTP a number of highly trained persons had been assigned to it and had thereafter been collected in so-called 9-A pools There were several hundred of these who were made available and assigned to the atom bomb project to work in their laboratories as their military assignment General Groves has said that "there are men without whom we could not have done this thing" I think it is worth while pointing out that this means that these several hundred men were, according to this statement, the difference between success and failure of this project Here, then, in several hundred individual decisions, some one did make the mistaken decision that each of these men was of more value as an unassigned soldier than as a scientist Only the good fortune that these men were not sent overseas before being assigned to the Manhattan District project permitted the nullification of these errors of decision and thus assured the acceleration of the atomic bomb project to success

No one would seriously attempt to evaluate the worth of the atom bomb project as less than a few hundred unassigned soldiers Yet, in fact, that was the accumulated effect of these several hundred individual decisions in the inductions of these men

There is, however, plenty of evidence that the profound implications of the scientific contributions to our military strength during the war have created a desire in the United States to exploit further the possibilities then opened up The services are very much alive to the need for sound scientific programs This is shown in plans for extensive new laboratories and additions to old laboratories The services are being reorganized to give further scope to scientific work Extensive training programs are being expedited to create a corps of scientifically trained officers And the services are planning to support basic science research in the universities and colleges of the land Industry has sharply increased its role in research New laboratories have been announced by a number of very large users of science Most of our companies are either planning increased research activities or are seeking access to established research facilities Universities and colleges are displaying unprecedented interest in their science departments And the government, generally,

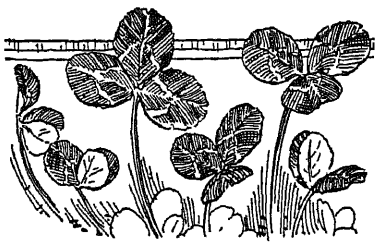
HOBBY NIGHT—Marilyn Rohrer, extensive collection of brains; Stephen Arnold, cosmic ray counting apparatus; Jules Kernen, results of ecological study of the flora and fauna of a vacant lot. Second row: Josephine Raskind explains her exhibit of the embryological development of Physa to Richard Lewontin; Joan Lines, sample of casein and information about other types of plastics; Elizabeth Laufer, topographic map of her school. Third row: Arthur Sicular, production of direct, constant voltage by induction; Abraham Schweid, miniature bacteriological laboratory; Gordon Newkirk, photographs of the moon he took through a six-inch reflector. Bottom row: John Champeny, reflecting astronomical telescope; Gilbert Seely, homemade spectroscope; Harold Zirin, eight-inch equatorial reflector telescope; Neal Kindig, natural forms of gypsum and plaster and cement test blocks.



BOTANY LINGUISTICS

NATURE RAMBLINGS

by Frank Thone



What Is a Shamrock?

➤ IRELAND'S SHAMROCK, probably the most-disputed plant in all botanic history, is really a yellow-flowered species of clover, Rev. Hugh O'Neill, professor of botany at the Catholic University of America, has decided after a careful re-examination of all available linguistic evidence. It is not, as frequently asserted, either the oxalis or the common white clover

The notion that the shamrock was an oxalis apparently got started by Renaissance English writers. In Campion's History of Ireland, written in 1571, the shamrock is described as a three-leaved plant, sour-flavored, that grew along with watercress in woody places and was used as food Only one plant fits that description, the wood-sorrel or oxalis (*Oxalis Acetosella*). This plant is also common in the United States.

The proper Gaelic name for the oxalis, Father O'Neill found on further searching, is not *seamrog* (pronounced "shamrock") but *seamsog*. The confusion may have arisen from the fact that in the Gaelic alphabet the characters for "r" and "sh" look very much alike. This very natural mistake, apparently made by an early English writer, was perpetuated for a long time, so that the oxalis became entrenched in English literature as the shamrock

In Irish literature, Father O'Neill states, *seamrog* always means clover; the words for oxalis are *seamar coille* and *seamar gear* A very early Celtic clover-word was *seamar*—the *-og* ending was picked up later

Two kinds of clover that grow in Ireland have been contenders for the honor of being the true shamrock· the common white clover (*Trifolium repens*) and a yellow-flowered species known to botanists as *Trifolium dubium* v *minus* The overwhelming majority of Irish people, Father O'Neill states, favor the yellow-flowered plant, though the other species still retains its champions

As independent confirmation, Father O'Neill cites an investigation made only a few years ago by a Benedictine scholar in the Glengarry region in Scotland where a few old people still speak the "old language" These elderly Gaelic-speaking Scots, born before 1850, all knew clover, and only clover, as *seamrog*, or shamrock.

Science News Letter, March 16, 1946

From Page 170

is quite concerned about its place in the furthering of science There are for example two bills to be brought out in the Senate—one to create an ambitious science research foundation under Federal auspices and another to set up a Federal atomic energy research program There seems every evidence that we are alert to expanding our physical facilities and providing the necessary funds

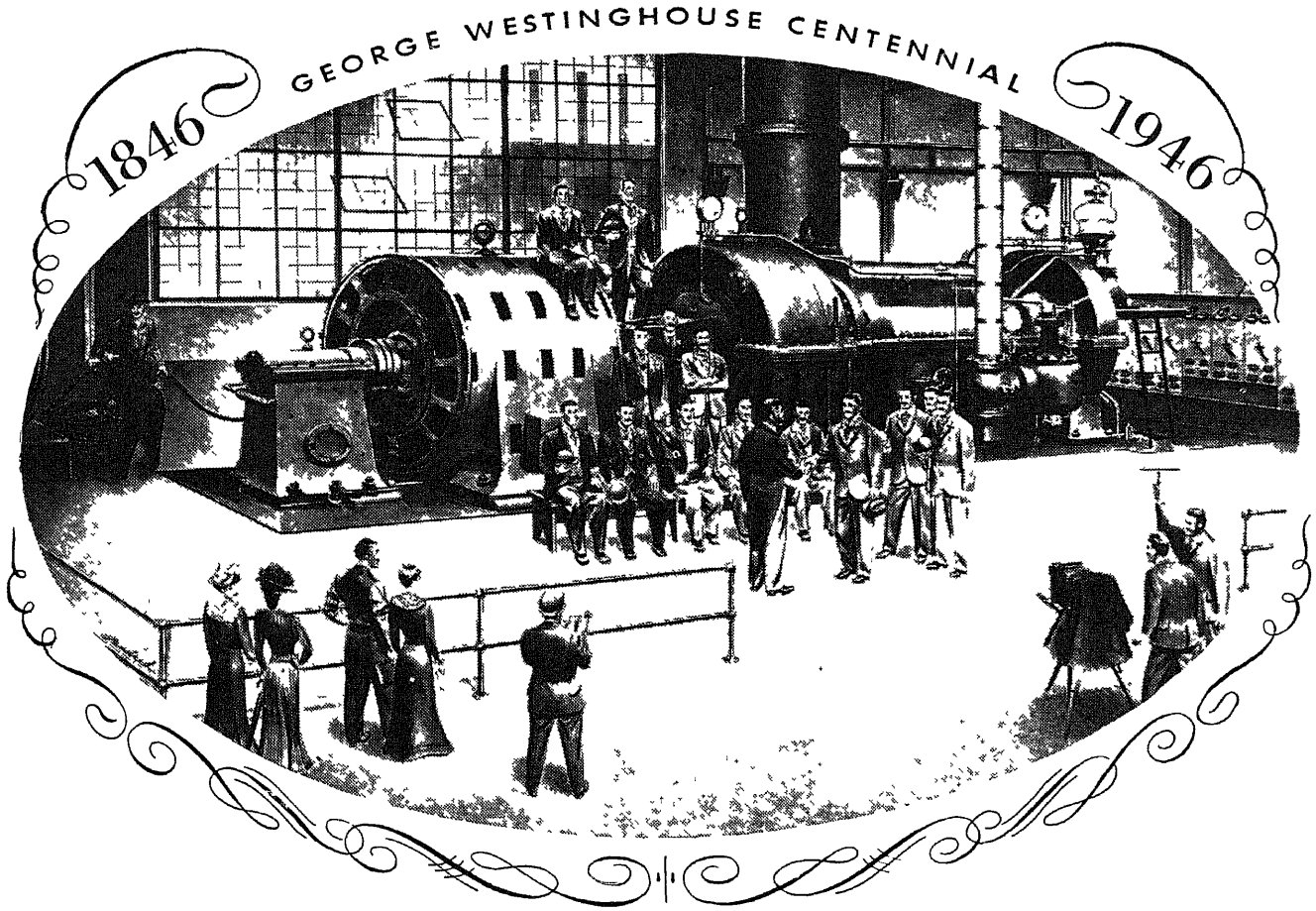
With regard to scientific manpower, the story is different There is, and will be for some time, a shortage of such personnel Throughout the war we began cutting down on training in some fields as early as 1940 From then on progressively the flow of trained manpower in the sciences was reduced The resulting deficit is large and will be costly That, of course, is past history and is well known

The unfortunate aspect of the situation is that no positive recovery measures have been adopted

The general attitude is that the present great flood of veteran students now on the campuses and about to return to them will quickly fill up the ranks of trainees in the sciences There are, however, some very obvious limitations here. In the sciences the number of students who can register for advanced work is limited to those who have finished the preparatory work. The seniors who are now enrolling must once have been juniors, and the graduate students must once have been seniors. At present in the science graduate schools and in the sophomore, junior and senior classes in the sciences, the enrollments must be limited to those who left college for the services with unfinished courses, and in view of selective service history which began the pinch on enrollments at the freshman class and progressively rose through the years, there are not as large a number of returnees as is generally supposed. Information in my hands is incomplete, but it indicates that the graduate schools by and large are not full in most sciences in spite of scholarship programs and the release for advanced study of wartime research workers

In a sampling of 57 universities, for example, the graduate enrollment in chemistry in the first semester was about 50% of the average for the immediate prewar years Even with an additional 7% increase due to veteran enrollment, only 57% of the prewar average is indicated in the second semester In the fields such as physics, mathematics and geology the graduate schools are similarly not crowded with G I 's to judge by returns from a sampling of institutions immediately preceding the end of the first semester. Results showed enrollments in physics as 16%, geology as 30% and mathematics as 12% of a normal prewar graduate enrollment The non-veteran enrollment in these graduate schools in these fields was considerably greater, being in physics 83%, in geology 30% and in mathematics 100% of prewar norms These higher enrollments are in large part made up of those students who were on war research and are now deferred to finish their training. In the undergraduate classes where no deferments are now granted in general to non-veterans and where the enrollments are therefore confined to veterans and physically disqualified students the enrollments are very low as is indicated by data collected A sampling of enrollments of seniors in about 60 institutions at the end of the first semester gives in percentages of normal prewar enrollments, the following figures in physics, veterans 9%, non-veterans 28%; in geology, veterans 10%, non-veterans 20%; in mathematics, veterans 11%, non-veterans 18%. The corresponding junior enrollments are in physics, veterans 12%, non-veterans 36%, in geology, veterans 25%, non-veterans 21%, and in mathematics, veterans 13%, non-veterans 18% More complete canvasses are needed and will be obtained for the second semester as soon as possible But the results quoted indicate quite definitely that there is not yet any sufficient flow of science students in the colleges to even approach the prewar numbers And the existence of war time deficits should call for even much increased numbers

To achieve a full program of training in the sciences so as to meet the great unfolding challenge of the future, to provide for our welfare and security and to lead the world to a higher level of comfort and stability through a higher technological standard of living, we should have a program as full and carefully



WHIRLING POWER

EARLY in life, George Westinghouse dreamed of a new and better source of power that would make obsolete the ponderous *reciprocating* steam engine of his day

Even as a boy he had wrestled with the problem—securing his first patent on an engine of the *rotary type* when only 19 years old

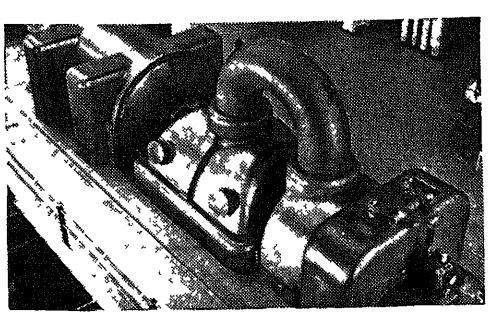
Years later, Westinghouse heard the exciting news about a *new type of rotary engine,* developed by Sir Charles Parsons in England It was a steam turbine . using *jets of steam* to drive whirling blades

Here was the answer to the problem that had fascinated Westinghouse since boyhood—and he promptly acquired the American rights

The next few years were busy ones for George Westinghouse With characteristic energy, he applied all his inventive genius in developing the still crude steam turbine into a *compact power source* for generating electricity

Then, in 1900, Westinghouse installed a 2000-kilowatt steam turbine generator at Hartford, Connecticut — by far the largest then in existence

It was the *first* practical central station turbine generator in America a *new* application of whirling power that was to bring the benefits of electricity to people all over the world



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TODAY America annually produces more than two billion kilowatt hours of electricity and more than three-fourths of the generating capacity in America is in steam turbine generators Westinghouse manufactured a large share of these turbine generators—some developing more than 200,000 horsepower each In 1946, more than a million horsepower of Westinghouse steam turbines will go into American power plants

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drawn as any on the physical and financial side It should be designed to bring back to the campuses to complete their training all those whose courses were interrupted, including those not yet discharged from the services, and it should provide for selection and training of our ablest youth Above all, it should be a well-rounded program which should set as its goal the provision of well-trained and adequate leadership in all fields, not only scientific but also in such fields as the social sciences, the humanities and the fields of social and ethical leadership America has come face to face with the need to assure higher education for its ablest youth We need a program of selection and training of our best brains It will be fatal to avoid the challenge I am glad the Westinghouse Science Talent Search so ably dramatizes the need for this and points to the method to be used in its realization I am very happy to have had this small part in this great undertaking

Science News Letter, March 16, 1946

PUBLIC HEALTH

Vaccine Can Increase Food

Developed to defend the United States and Canada against germ warfare, it can provide more nourishment for a hungry world.

By JANE STAFFORD

➤ MORE FOOD for a hungry world, particularly those regions most frequently visited by famine, can come from a vaccine developed to defend the United States and Canada against germ warfare

The vaccine is for protection of cattle against rinderpest, or cattle plague This highly fatal cattle disease has never existed in the United States or Canada and is now non-existent in the Western Hemisphere

Even before those mysterious paper balloons from Japan began descending in regions close to the great cattle-grazing areas of western United States and Canada, however, military authorities were seriously concerned over the possibility of the virus of this disease being introduced by accident or by enemy action If that had happened, the disease would have spread like wildfire through the herds Lack of any previous contact with the disease makes our cattle highly susceptible to it

To fight this war disease threat, a joint U S-Canadian commission was appointed by the Secretary of War and the Canadian Minister of National Defense Members of the commission were Dr J. Craigie of the University of Toronto; Dr R E Dyer, director of the U. S. National Institute of Health, Dr E B Fred, President of the University of Wisconsin, Brig Gen R A. Kelser of the U S Army Veterinary Corps, Dr C A. Mitchell of the Canadian Ministry of Agriculture, Prof. E G D. Murray of McGill University, Montreal, Dr. J B. Reed of Queen's University, Kingston, Ont., and Dr. H W. Schoening of the U S Department of Agriculture

On Grosse Isle in the lower St Lawrence River, isolated island site of a former quarantine station, this commission early in 1942 assembled a group of scientists and technicians and gave them a two-part mission First part was to prepare a vaccine to provide rapidly the means of surrounding an epidemic, should it occur, with a ring of immunized animals The second part was to develop a more efficient or cheaper vaccine against rinderpest than those then available

Almost a year before an atomic bomb dropped on Hiroshimo, the scientists were able to report Mission accomplished Now, with the war over, the first victims of Jap aggression will get the peacetime benefits of the mission

The commission turned over to UNRRA one million doses of the vaccine for use in China This will be shipped as soon as personnel and facilities can be established there for doing the vaccinating job, Dr Irving G Cashell at UNRRA headquarters states Rinderpest is the Number One cattle disease in China today, Dr Schoening told me This plague attacks cattle of all kinds and interferes with agriculture because cattle are used in China as draft animals and beasts of burden Rinderpest epidemics cut down the supplies of both meat and crop foods UNRRA has a report of a severe one in one locality in China now, and the disease exists there always

The vaccine which in time should free China and also India and Africa of this plague and famine threat was developed at Grosse Isle by the following scientists Capt James A Baker, V C, U S Army, Capt H K Cooper, V C, U S Army, Capt Henry Griffiths, General List, Canadian Army, Lt Col M W Hale, V C, U S Army, Capt Dubois L Jenkins, V C, U S Army, Maj Fred D Maurer, V C, U S Army, Capt Thomas C Robey, V C, U S Army, Comdr Richard E Shope, M C, USNR, and Maj R V L Walker, P L D G, Canadian Armored Corps

Rinderpest, though it does not attack man, has been one of the most important maladies of livestock from earliest times It has caused tremendous losses of cattle, killing from 70% to 100% of the animals in various epidemics Several hundred years ago it spread from its earliest home in Egypt to European countries, where it raged almost constantly until the 1870's

Extensive outbreaks were always associated with wars In one three-year period one and one-half million cattle were stricken The disease broke out in Belgium in 1921 after the first World War, but was eradicated It still exists in Asia, India and East and South Africa, though in South Africa the well-organized veterinary police are able to keep it under a certain amount of control

The Philippines, also, have been affected by rinderpest which attacked the carabao, important draft animals there It was in the Philippines that Gen Kelser, who was a member of the joint U S-Canadian commission, developed a vaccine against the cattle plague

This vaccine and another similar one were made from the rinderpest virus obtained from cattle and inactivated by chemicals, such as formalin It successfully protected animals, but only relatively small quantities could be made, since it had to be obtained from cattle It also carried the danger of containing germs of other diseases that might have been present in the cattle from which the virus was obtained

The scientists at Grosse Isle therefore turned to fertile hen's eggs, which have been used for production of yellow fever, typhus fever, influenza and other vaccines They had some failures at first, but finally succeeded in growing the virus on the eggs in such a way that it lost most of its disease-producing power but kept its ability to give the cattle resistance to rinderpest

In one crucial trial, 10 vaccinated and four non-vaccinated calves were put into the same pen where for 23 days they milled around together, drinking from the same water trough and eating from

each other's feed boxes if they wished Then one more non-vaccinated calf was added to the group as a control and all of them were given shots of virulent rinderpest virus All the vaccinated animals proved to be immune to the disease All the non-vaccinated ones developed the disease and died or were destroyed at the point of death

At one stage of the work, the possibility of chickens and other birds being a reservoir of the disease, which might be spread from them by blood-sucking insects, was considered This developed from the unique finding that embryos which had been infected with the virus would develop into chickens This has never occurred in embryos infected with other viruses The baby chicks had the virus in their bodies for as long as five days, but fortunately it did not get into the blood where it would have been available to insects for possible transfer to cattle

The scientists at Grosse Isle worked not only under strict military secrecy but under constant and most vigilant precautions against possible escape of the virus from their island laboratory The danger of accidentally starting an epidemic of rinderpest in Canada or the United States was so great that, as one of many precautions, no hay was fed to any of the animals This was because of the difficulty of disposing of the remnants, since even a shred of infected hay might cause a disastrous epidemic

Calves vaccinated with the egg virus are solidly protected against rinderpest within 10 days after vaccination The vaccine causes a mild disease in the calves but this mild form of the disease does not seem to be contagious

The undried virus keeps well at temperatures well below freezing, but rapidly loses its potency at room temperature It therefore has to be dried from the frozen state For their first practical drying apparatus, the scientists used a defective depth bomb casing which happened to be available in their island locality Early in 1945 they obtained a commercial experimental dessicator

The dried vaccine packed in vacuum keeps as long as 15 months at temperatures close to freezing, but should be given to cattle within 12 hours after reconstituting it from the dried state

Science News Letter, March 16, 1946

Books of the Week

BIOLOGY AND CONTROL OF THE AMERICAN DOG TICK—Carroll N Smith, Moses M Cole and Harry K Gouck—*Government Printing Office,* 74 p, diagrs and illus, 20 cents U S Technical Bull, No 905

BURMA SURGEON RETURNS—Gordon S Seagrave, M D—*W W Norton,* 268 p, illus and maps, $3 The story of Dr Seagrave's medical mission in Burma after the Japanese occupation He writes of the medical problems and achievements of his unit and of the future of medicine and missions

COMMON-SENSE BUSINESS LEADERSHIP A Manual of Human Relations—G E Fosbroke—*Duell,* 177 p, $2 50 A definition of business leadership and suggestions about how it may be developed with a knowledge of the basic principles of human relations and liberal applications of common sense

THE ELECTRON MICROSCOPE An Introduction to Its Fundamental Principles and Applications—E F Burton and W. H Kohl—*Reinhold,* 325 p, diagrs and illus, $4 A presentation of the physical principles upon which the operation of the electron microscope is based, making no assumptions in regard to the technical knowledge of the reader

ESSENTIALS OF GENERAL CHEMISTRY—B Smith Hopkins and John C Bailar, Jr—*Heath,* 520 p, tables and illus, $3 50 A textbook for use in college freshman classes.

AN INTRODUCTION TO EDUCATIONAL STATISTICS—C W. Odell—*Prentice-Hall,* 269 p, tables, $4 67 A textbook pre-supposing no preparation in mathematics beyond high school algebra and geometry and designed to cover a one semester's course

AN INTRODUCTION TO HUMAN ANATOMY—Clyde Marshall, M D, revised by Edgar L Lazier—*W B Saunders,* 418 p, illus, $2 50, 3rd ed. A textbook for use in colleges

LET'S FIND OUT A First Picture Science Book—Herman and Nina Schneider—*William R Scott,* 39 p, illus, $1.25. Experiments with very simple equipment to be found around the house For 6 to 9 year olds

LISTENING TO MUSIC CREATIVELY—Edwin J Stringham—*Prentice-Hall,* 479 p, illus, $5 An introduction to the broad world of music, revealing some of its inner workings, its historical traditions, its vocabulary, and establishing a practice for general listening

MARINE MICROBIOLOGY A Monograph on Hydrobacteriology—Claude E ZoBell, *Chronica Botanica,* 240 p, tables and illus, $5 Foreword by Selman A Waksman

THE PRINCIPLES OF HEREDITY—Laurence H Snyder—*Heath,* 450 p, tables and illus, $3.75, 3rd ed An introductory textbook developing the principles of heredity as far as possible on the basis of organisms with which the reader is familiar This revised edition includes material on the Rh factors, the bearing of these factors on feeble-mindedness, etc

SUNSPOT CHANGES AND WEATHER CHANGES—H H Clayton—*Smithsonian Institution,* 29 p, diagrs and tables, 20 cents Smithsonian Miscellaneous Collections, Vol 104, No 19

WOMAN AS FORCE IN HISTORY A Study in Traditions and Realities—Mary R Beard—*Macmillan,* 369 p, $3 50 A survey of the relationship between men and women from earliest times to the present and of what history shows of the way in which men and women have actually lived and worked together

Science News Letter, March 16, 1946

MEDICINE

Production of Hemoglobin Speeded After Hemorrhage

➤ PRODUCTION of hemoglobin, which gives blood its red color, may be speeded after severe hemorrhage by doses of a vitamin and another chemical derived from a vitamin, it appears from studies by Dr M L Scott, Dr L C Norris and Dr G F Heuser, of the Agricultural Experiment Station and School of Nutrition at Cornell University

Hens that had lost about one-third of the blood in their bodies made up the loss with hemoglobin quantities back to normal within eight to nine days when given the two vitamin-chemicals, the scientists report (*Science,* Mar 8)

The two chemicals that produced this speedy hemoglobin regeneration in the hens are the L casei factor, which is a form of the vitamin, folic acid, and pyracin, also called pyrodoxic acid and derived from another vitamin, pyridoxine.

Science News Letter, March 16, 1946

France is the first of the liberated countries to start *penicillin* production



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New Machines And Gadgets

⚙ *WHEELBARROW that easily passes over ordinary obstacles in its path has an extra wheel mounted in front of and above the regular wheel The two wheels carry an endless tractor-type tread which, when it comes in contact with an obstacle, raises the front of the barrow over it*

Science News Letter, March 16, 1946

⚙ *NONSPILLABLE inkwell is nearly spherical in shape but remains upright because the wall of the lower part is thick and heavy The opening through which the pen is inserted is a tube projecting inward to about the center of the sphere If upset, this tube prevents spilling.*

Science News Letter, March 16, 1946

⚙ *RUBBER GLOVE for household use has a solid inner layer of rubber latex and an outer layer containing many minute open pits that constitute a surface roughening for the inner layer It is not slippery when wet, it is claimed.*

Science News Letter, March 16, 1946

⚙ *FOG DISPENSER for lifting fogs on airfield runways, an improvement on the English "Fido," burns fuel oil instead of gasoline The system consists of a series of burners, ignited electrically from the tower, each of which has an atomizer to prepare the fuel for complete combustion*

Science News Letter, March 16, 1946

⚙ *PLASTIC "LUNG" for artificial respiration weighs only 60 pounds, about one-eighth the weight of standard iron lungs, permitting a patient to sit up, or perhaps walk or drive. The picture shows*



its application to a bed patient The unit is convenient for lifesaving stations and small hospitals Photograph from Ziff-Davis.

Science News Letter, March 16, 1946

⚙ *"ELECTRIC HAND" is the key to a so-called electronic myodynemeter to measure the extent of muscle impairment and recovery in infantile paralysis cases The "hand," which, in use, is pressed against the muscle, contains a delicate wire strain gauge whose electrical resistance changes as it is stretched*

Science News Letter, March 16, 1946

⚙ *SYNTHETIC RUBBER HOSE reinforced with Fiberglas inner braid is found satisfactory for carrying hot plastic paint at a temperature of 300 degrees Fahrenheit to spray nozzles used in painting ship hulls The hose has the tensile strength and heat-resisting qualities required*

Science News Letter, March 16, 1946

⚙ *CALCULATING DEVICE, composed of three concentric celluloid printed disks which can be rotated on the same center, is used to determine the amount of radiation required for steam and hot water heating systems When the disks are properly set, printed figures on them give the answer*

Science News Letter, March 16, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St, N W, Washington 6, D C, and ask for Gadget Bulletin 302*

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Question Box

BOTANY-LINGUISTICS

What is a shamrock? p 172

CHEMISTRY

How has shrinkage in wool suits been reduced? p 168

GENERAL SCIENCE

In what way is the Army stifling science? p. 163.

What does the top girl winner in the Fifth Annual Science Talent Search hope to be? p 163.

GENERAL SCIENCE-EDUCATION

How do the number of veterans returning to college for scientific training compare with what is generally supposed? p. 170

MEDICINE

How has the production of hemoglobin after hemorrhage been speeded? p. 175

What mission was given to the nation's most scientifically talented high school boys and girls by Dr. Waksman? p 167

What new method of giving penicillin has been introduced? p. 168.

PHOTOGRAPHY

What new photographic printing paper is now available? p 169

PHYSICS

What was the first evidence that atoms can break apart? p 167

PUBLIC HEALTH

How can a vaccine help to feed a hungry world? p. 174.

Where published sources are used they are cited

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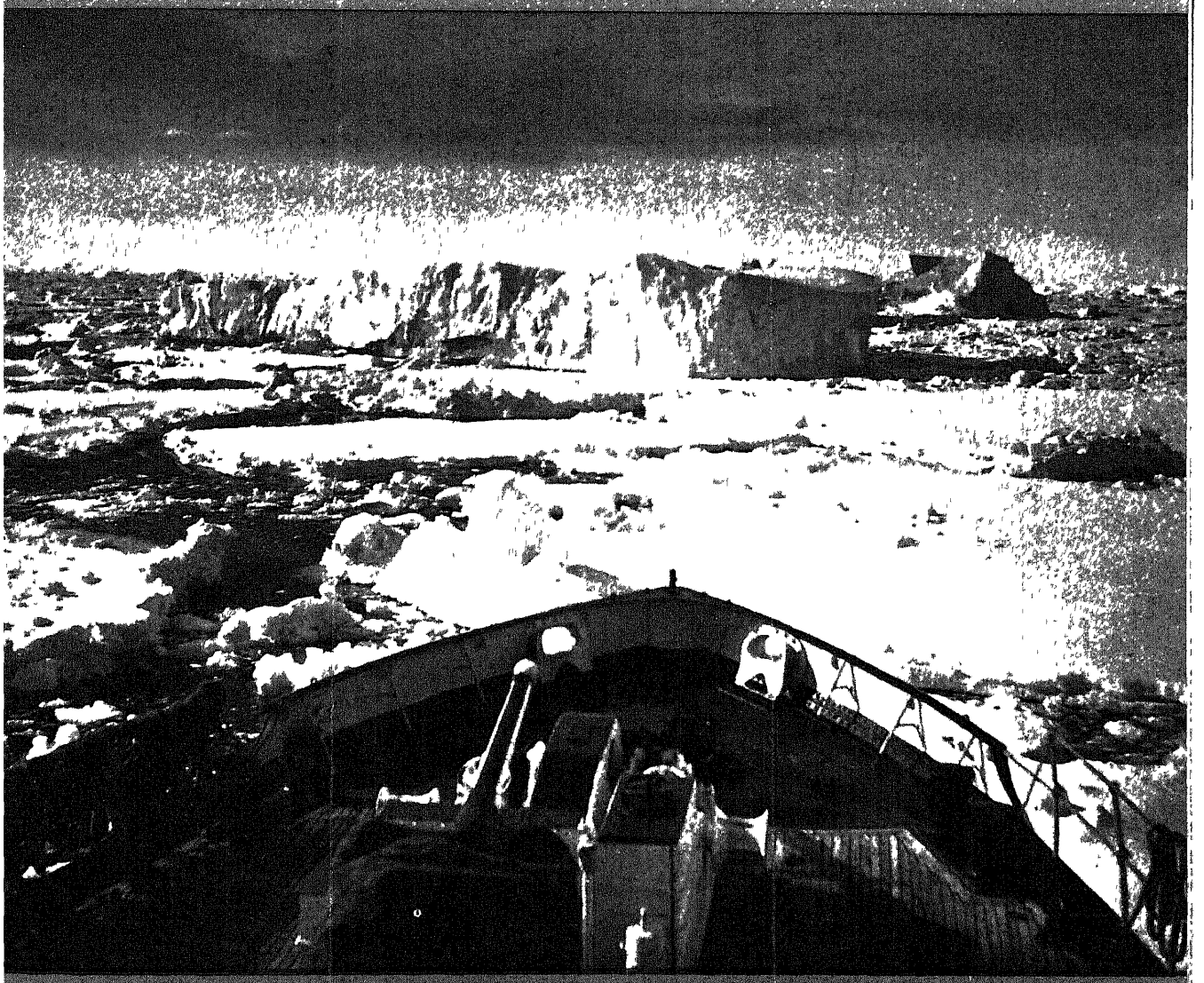
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SCIENCE NEWS LETTER

Vol. 49, No. 12

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 23, 1946



Spring Plowing

See Page 182

A SCIENCE SERVICE PUBLICATION



RCA Laboratories provides another great achievement in television—the "mirror-backed" Kinescope, or picture tube.

New "searchlight brilliance" for home television!

Now, large screen television pictures are twice as bright—yes, *twice as bright* as ever before!

You can "count every eyelash" in the close-ups. You'll almost want to shake hands with the people on your television screen—so great is the illusion that they are actually in your living room

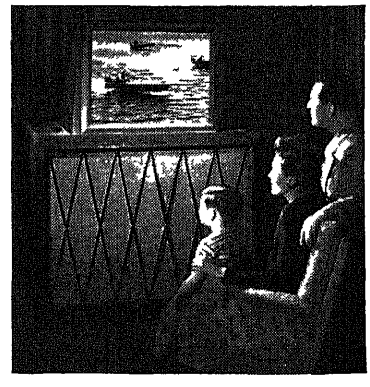
This new sharpness and brilliance is achieved through the new RCA "mirror-backed" Kinescope, or picture tube, perfected at RCA Laboratories.

It has a metallic film—eight-millionths of an inch thick This metallic film acts as a reflector, allowing electrons to pass through to the screen but preventing light rays from becoming lost through the back of the tube Just as the reflector of a searchlight concentrates its beam—so does this metallic film reflector double the brilliance and clarity of detail in home television receivers

Similar progress-making research at RCA Laboratories is being applied constantly to all RCA Victor products—assuring you that anything you buy bearing the RCA monogram is one of the finest instruments of its kind science has achieved

. . .

Radio Corporation of America, RCA Building, Radio City, New York 20 Listen to The RCA Victor Show, Sundays, 4 30 P M , Eastern Time, over the NBC Network



RCA Victor home television receivers will be available in two types One model will have a direct-viewing screen about 6 by 8 inches The other type will be similar to the set shown above—with a screen about 15 by 20 inches Both instruments are being readied for the public with all possible speed and should be available this year

RADIO CORPORATION of AMERICA

MEDICINE

A-Bomb Effects Studied

People of Nagasaki and Hiroshima need to be studied for many years to determine long-range effects on blood, disease resistance and reproduction.

➤ THE PEOPLE of Hiroshima and Nagasaki must be followed for many years to determine the long-range results of atomic bombing on their blood, resistance to disease and ability to have normal children, Capt Shields Warren of the Navy Medical Corps, declared at the meeting of the American Association for Cancer Research in Atlantic City

Capt Warren, who is president of the association, was chief medical officer of the Naval Technical Mission to Japan and his report is the first official public account of the Navy's medical investigation of the effects of the atom bombings

"The distinctive feature of the atomic bomb is the large amount of radiant energy which it produces," he pointed out

Its chief effects on the body are 1 the effects of heat, producing primary injury of the flash burn type and secondary injury due to fires started by the bombing, and 2 the effects of short-wave radiation and neutrons which closely parallel the effects familiar to medical scientists from experimental studies of the effects of X-rays

"This radiation was produced in an instant," Capt Warren reported Security prevented his stating the exact duration of time and the type and quantity of radiation

The immediate effects from radiation injury as a result of atomic bomb explosions were weakness, malaise, fever and often death These effects appeared usually within 48 hours Capt Warren and his group looked for the delayed effects in the blood, blood-forming tissues and sex glands, tissues known to be particularly sensitive to radiation

Damage to the blood-forming tissues fell into three chief groups The first was the one in which the white cells of the blood, important defenders against disease germ invasion, were greatly reduced in numbers Infection, particularly Ludwig's angina, was the outstanding feature The great bulk of deaths in this group occurred within the first three weeks after the bombing

Within three to five weeks after the bombing, a considerable number of persons died of hemorrhage, the result of lack of elements in the blood necessary for clotting This was due to radiation damage to certain cells of the bone marrow The hemorrhages varied from extensive black and blue spots to massive bleeding from various openings of the body Although Capt Warren did not say so, these hemorrhages might have been what gave rise to rumors of elderly women being rejuvenated by the atomic bomb's effects

Those with serious bone marrow damage who weathered the first few weeks developed anemia later with red blood cell counts in some dropping to as low as 1,000,000 or less, which is less than one-fourth the normal

The atomic bombing's effects on the sex glands were much more prominent in the case of men than women, Capt Warren reported Changes noted in previously normal high school girls may have been due to psychic shock and malnutrition as well as to direct effect on the ovaries, he suggested Although women of child-bearing age only occasionally showed damage to the ovaries of a kind to interfere with ability to have children, this type of damage in men was striking

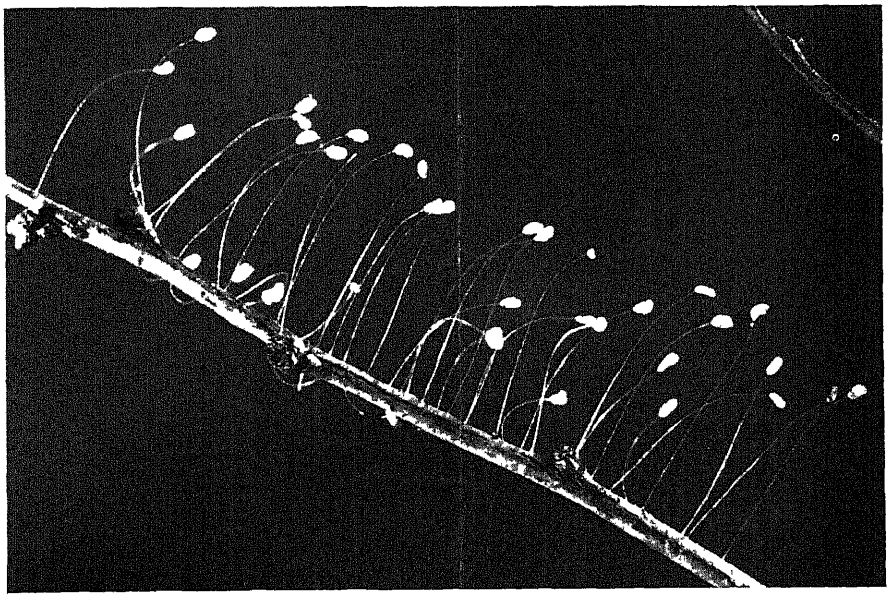
The treatment given A-bomb victims by the Japanese was "utterly inadequate," Capt Warren found

The number of deaths should have been materially reduced if victims had been given repeated blood transfusions and penicillin to control the infection during the period of white blood cell anemia

On the much discussed question of danger from left-over radioactivity in the area after atomic bombing, Capt Warren stated

"We were fortunate in locating a number of persons who had entered the bombed areas soon after the explosion and had remained there None showed any deleterious effects"

In other words, the area was safe for



INSECT EGGS—This photograph shows the odd way in which the lacewing fly places her eggs as a means of preventing her carnivorous offspring from eating each other. The young, called aphis lions, are so hungry when they hatch that the first one out would eat up all the eggs containing the others. So she secretes a series of stiff, silk-like stalks with her eggs attached to their ends. Then as each larva hatches out it crawls down the stem and goes away from the rest of the eggs in its search for something to eat. Aphis lions feed on plant lice, and are very valuable in keeping down these pests. Photograph by George A. Smith, of Quarryville, Pa.

humans soon after the bombing was over

Besides the heat and radiation effects, atomic bombs also produced the blast effects of the conventional types of bombs Survivors might suffer from flash burns, blast injury and radiation injury simultaneously In the cities and villages around Nagasaki and Hiroshima it was easy to pick out the irradiated refugees by the characteristic flash burns and frequent baldness Of the 80,000 who died at Hiroshima and the 45,000 who died at Nagasaki it would be very difficult to say what proportion were killed by one or another type of energy

A very striking feature of the heat injury of the A-bomb was the speed with which it acted and passed Clothes, wisps of hair, or even the shadow of an arm across the body were enough to protect against this kind of burn, Capt Warren reported He showed a picture on which the profile of blades of grass stood out in relief against the burned background of a board bunker where the intense but instantaneous radiant heat burned the wood before the grass had time to wave or wither

"The destructive effect of the blast was centrifugal except at the hypocenter (the project of the true center on the ground) where it was essentially vertical," Capt Warren added in a brief description of the nonmedical aspects of the A-bombing effects

"Consequently some poles and trees stood at the hypocenter, although extensively levelled elsewhere The importance of streamlining in resisting blast was well shown by factory smoke stacks, the great majority of which stood."

Science News Letter, March 23, 1946

ELECTRONICS

Wind-Finding Equipment

Developed during the war, it provides data on conditions in the upper atmosphere. Gives speed and direction of wind. Is known as a transponder.

➤ "Wind-finding" equipment, which provided data on conditions in the upper air vitally needed by the armed services, was developed during the war by the National Bureau of Standards, it is now revealed Initially the project involved means for increasing the usefulness of radiosonde, which automatically transmits, by radio, data on barometric pressure, humidity and temperature from different altitudes as the balloon carrying it ascends The Navy also wanted data on the speed and direction of the wind

The new device is known as a transponder, the Department of Commerce says, and is also called a re-emitter because it picks up signals and re-emits them back to a receiving station on the ground In plain English, it is a two-way radio set which operates on the principle of amplitude modulation, widely used in broadcasting. Because this device requires a rather complicated antenna which swings from one position to another, it was found impracticable for installation on fighting ships because of their constant roll.

The answer to the problem was found in the "corner cube reflector" and the "pulse repeater" which operated on ships without interfering with other equipment. The corner cube reflector operates on the same principle as the reflectors commonly found in road signs throughout the country When a radio or radar signal strikes the corner cube reflector as it revolves under the small balloon by which it is borne aloft, it is reflected back to the ground or ship station

Fire-control radar follows the balloon, just as it follows a plane in order to provide data for aiming anti-aircraft guns From these data the naval meteorologist is able to trace the position of the corner cube reflector as it moves through the air and to determine the direction and speed of the wind

The pulse repeater is a small two-way unit which receives signals or pulses and repeats them in stronger volume In addition to providing data on wind direction and speed for weather analysis, the device has a very definite application to ballistics, supplying information on wind conditions for correction of fire-control data.

The work of the National Bureau of Standards on wind-finding equipment was sponsored and financed by the Navy, which also made available to Bureau experts the Navy's modern radar laboratory on Chesapeake Bay

Science News Letter, March 23, 1946

ENGINEERING

Internally Cooled Piston For Explosion Engines

➤ AN INGENIOUS idea for an internally cooled piston for heavy-duty explosion engines is embodied in patent 2,396,500, obtained by Walter Gasser of El Cerrito, Calif The upper end of the hollow connecting rod is expanded into a large sphere, around which a collar-like piston fits, ball-and-socket fashion The top of the sphere thus constitutes the piston head Oil is forced up through the hollow connecting rod in a cooling jet against this hot surface Rights in the patent are assigned to the Shell Development Company

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MEDICINE

Glaucoma Weapon

Chemical that failed as war gas may help those with the blinding eye disease and may lead to better understanding of myasthenia gravis.

➤ A CHEMICAL that failed as a war gas nevertheless held the spotlight at the meetings of the Federation of American Societies for Experimental Biology in Atlantic City The reason Trials on patients show that it may help those with the blinding eye disease, glaucoma, and may lead to better understanding of and treatment for the muscle weakness disease, myasthenia gravis, and perhaps other ailments involving nerve and muscle chemistry.

In more than a score of patients with glaucoma, who had not been helped by physostigmine or pilocarpine, the usual medicines for this disease, the war gas chemical kept tension in the eyes normal and prevented further loss of visual fields, Dr. Irving H Leopold and Dr Julius H Comroe, Jr , of the University of Pennsylvania School of Medicine, reported

The chemical is di-isopropyl fluorophosphate, called DFP for short Early in the war British chemists explored its action because its effect in contracting the pupils of the eyes led them to hope it might interfere with enemy marksmanship This proved a false lead, but when scientists in our own Chemical Warfare Service at Edgewood Arsenal studied DFP they learned facts about its effects on body chemistry which led them to ask doctors at certain medical centers to try its value for patients

Some of the 76 glaucoma-affected eyes were not helped by DFP or any other medicine This occurred in 16 instances In another 24, DFP gave the same results as the two medicines commonly used for this eye ailment But 36 eyes were helped by DFP when other medicines failed.

DFP has a much longer lasting action than pilocarpine or physostigmine These drugs have to be dropped into the eyes three to six times every day, but in only 10 cases was it necessary to use DFP more than once a day Once a day was enough for the majority, while in one case DFP was needed only every 10 days

Undesired effects reported for DFP were blurring of eyesight, brow and eyeache, spasm of accommodation and peripheral vasodilation

DFP is not the final answer for myasthenia gravis patients, it appears from the report of its trial in seven patients by Drs Julius H Comroe, Jr , John Todd, and George Gammon and Lt George B Koelle and Maj Alfred Gilman These scientists, at the University of Pennsylvania and Edgewood Arsenal, also examined the effects of DFP on the blood, liver and kidneys of 20 normal persons No changes in liver, kidney or blood-forming functions were found, the most frequent undesired effects being on the stomach and intestines

DFP relieved the weakness of the myasthenia gravis patients for longer periods than did neostigmine, the usual drug for this ailment, but never to the same degree Muscle power was only partially improved by DFP, but markedly increased by neostigmine

With DFP's effects on body chemistry as a guide, however, scientists may be able to develop a more effective chemical than any yet known for treatment of myasthenia gravis

In studies of its effects on the body generally, DFP was given by injection into the muscles or by capsules that were swallowed When dropped into the eyes for glaucoma treatment, however, very little if any of it is absorbed by the body

Science News Letter, March 23 1946

MEDICINE

Electric Knife Now Used For Chest Surgery

➤ SURGEONS may now use the superior electric knife for the first time in chest operations as a result of a new anesthesia technique developed at the University of California Medical School A general improvement in such operations is expected from the development

In the new technique curare is used to paralyze the respiratory muscles and nitrous oxide to put the patient to sleep This eliminates the use of the explosive anesthetics which are ordinarily used and which preclude electric cautery.

The doctors explained that it is necessary in a chest operation to use an anesthetic which is potent enough not only to put the patient to sleep but to paralyze the respiratory muscles so that breathing can be controlled by gentle pressure on a breathing bag attached to the mouth

The explosive anesthetics, such as ether and cyclopropane, have been the only ones potent enough to accomplish both these purposes. The electric knife would cause an explosion on contact with these gases within the lung

A combination of nitrous oxide and curare is desirable because no bad after effects have been noted The gas is potent enough barely to put the patient to sleep, and the curare is strong enough for paralysis of the respiratory muscles.

The doctors have found the technique safe to use over the long periods of time —six hours is not unusual—required for a chest operation. It is especially advantageous when young doctors are operating, it puts them at their ease, they can work without pressure. Sixty-eight chest operations have been performed using the technique.



ON LOAN—A Coast Guardsman examines an old-style lighthouse lens. Schools, museums, and maritime societies may borrow this lens and many other old lenses from the Coast Guard. Because of the change from oil to electricity, other scientific improvements and modern designing, these old lenses, still in excellent condition, have been retired from active service.

The use of an electric knife in chest surgery is desirable because it congeals the blood quickly around incisions and prevents excessive bleeding in vital areas of the body

"The cautery has been used within the chest cavity in every case," the doctors reported recently "It has proven easy to produce apnea (paralysis of respiratory muscles) and control breathing, and no difficulty has been encountered on any case in persuading the patient to resume spontaneous respiration

"The patient's general condition during the operation and postoperative course has been excellent in all cases"

Science News Letter, March 23, 1946

ENGINEERING

Icy Waters Patrolled

Radar, loran and aviation will play part in North Atlantic iceberg patrol now being re-established as international service.

See Front Cover

➤ WAR-DEVELOPED radar and loran, as well as aviation, will for the first time play important parts in patrolling the North Atlantic for icebergs in shipping lanes, as shown on the cover of this SCIENCE NEWS LETTER, in the re-established International Ice Patrol, the U S Coast Guard announces. The service was discontinued Dec. 22, 1941, because of the disruption of normal maritime commerce, although a careful estimate of North Atlantic ice conditions was maintained throughout the war for the benefit of naval vessels and convoys

The danger season in the North Atlantic from icebergs in the waters patrolled by the U S Coast Guard extends each year from March or April to July The patrol area covers a region about the size of the state of Pennsylvania in the general region of the Grand Banks of Newfoundland, a section blanketed in fog during a large part of the time The fog is aggravated by the meeting of the Gulf Stream and the Labrador current Through the region passes the world's heaviest ocean traffic, Coast Guard officials state.

A constant patrol of the region will be maintained by aircraft and especially equipped cutters Airplanes of the B-24 type will be used by the aerial watch. The 254-foot cutters are powerful vessels, equipped for rescue at sea and for ice-breaking, and having other essential mechanical and electrical apparatus Both planes and cutters are equipped with radar and loran

The radar will assist in locating icebergs during low visibility Loran will give the exact location of a berg as soon as discovered This is important. In the past, patrol vessels have been fogbound for days Their position had to be determined by dead-reckoning and radio direction finder bearings With the use of loran, the patrol vessel's position can be determined within approximately one mile and warning given of the position of an iceberg sighted Loran will also afford a more efficient means of tracking bergs in their daily movements

Science News Letter, March 23, 1946

MEDICINE

Great Germ Killers To Be Useless Soon

➤ PENICILLIN and streptomycin will be useless as remedies against disease within five to ten years, Dr Hans Molitor, of the Merck Institute for Therapeutic Research, predicted at the meeting in Atlantic City of the Federation of American Societies for Experimental Biology

New antibiotics will then be needed for patients with pneumonia, streptococcus infections and the like, unless some chemist can synthesize penicillin and then change it enough to make it continually useful

The reason the two great antibiotics we now have are destined for the scrap heap of worn-out remedies in a few years is that germs are developing resistance to these chemicals Doctors may have to give a thousand times as much of these antibiotics and give it faster to get the patient well, Dr Molitor predicted

One thing that can be done to stave off the day of uselessness for penicillin and streptomycin is to refrain from giving them to any patient unless really necessary Use of penicillin in lozenges, salves, tablets and the like from which the patient gets only small quantities of the mold chemical or use in diseases it does not remedy, such as influenza, will hasten the day of penicillin's uselessness

When penicillin or streptomycin are used, they should be given in large enough doses to kill the disease germs in a few days, before they can get used to the antibiotic and grow resistant to it

A new idea of dosage of drugs has developed through penicillin and streptomycin, Dr Molitor said Formerly a doctor might look up in a textbook the average dose of a medicine for a certain disease and give that to his patient With the antibiotics he first must determine what germ is causing the trouble and then adjust the dose in each case to give a sufficient concentration of the antibiotic in the patient's blood to kill the germs

Science News Letter, March 23, 1946

MEDICINE

Prevention of Water On Brain by Diet Hinted

➤ THE TRAGEDY of a baby born with hydrocephalus, or water on the brain as it is popularly known, may be prevented in future by diet, is the hint in studies reported by Dr R L Richardson and Dr A G Hogan, of the University of Missouri, at the meeting of the Federation of American Societies for Experimental Biology in Atlantic City

Infants born with this condition can be recognized by their very large heads Usually they are retarded mentally and few survive to adulthood

The cause of the condition, the Missouri scientists report, may be an inadequate diet of the mothers before the babies are born The vitamin or other food chemical, lack of which might lead to this condition, is not known but apparently is contained in liver

When an eluate of a fuller's earth absorbate of a liver extract was added to the diet of 54 female rats, a total of 1,020 young survived until they were weaned and several thousand young were reared in the stock colony with no sign of hydrocephalus, the scientists reported A group of 230 female rats fed the same diet but lacking the liver material had 1,756 young which survived at the weaning age of 28 days, but there were in addition 30 which developed hydrocephalus between the ages of 10 and 24 days Of these 30, only two survived as long as 28 days

Science News Letter, March 23, 1946

Flue-cured *tobacco leaf* accounts for more than half the American crop and is used mainly in cigarettes.

PHYSIOLOGY

Bathtubs in the Sky

Pilots would be much less likely to blackout if they could sit in a tub full of water while doing fast turns and other evasive maneuvers.

➤ IF THE PILOT of a fighter plane could sit in a bathtub full of water while he was doing fast turns, loops and other evasive maneuvers, he would be much less likely to blackout, Drs C F Code, E H Wood and E J Baldes, of the Mayo Aero Medical Unit, told physiologists at the first session of the Federation of American Societies for Experimental Biology in Atlantic City

Sitting in a specially constructed bathtub built into a cockpit, men were spun around on a human centrifuge to test the effects of immersion in water as protection against blackout The men sat in exactly the same position that they would have to assume if they were in a plane dodging the enemy in fast maneuvers

First tests were made sitting in the tub without water Later water was added to various body levels

On the average, with water up to just below the breast bone, the men were protected against the effects of acceleration to an amount expressed as 0 9 g When the water level was raised to the level of the third rib, the protection was 1 7 g, which is comparable with the protection given by the special anti-blackout suits

Presumably, the water in this sky bath should not be hot or even pleasantly warm, because these same investigators, working with another colleague, Dr E H Lambert, found that warm, humid surroundings lower tolerance for sudden changes of direction and speed

Based on tests conducted on the human centrifuge, it was concluded that at a temperature of 89 degrees Fahrenheit and 77% relative humidity, tolerance was reduced as much as 0 7 g from what it is at 63 degrees F , 72% relative humidity

Another way of protecting the pilot against blackout may be to give him a full meal or a couple of quarts of milk or water before he takes off Drs William G Clark and Helen Jorgenson, of the Department of Aviation Medicine, University of Southern California, reported to the same session that a heavy meal increased tolerance to positive acceleration although only slightly Drinking about two quarts of liquid (1 5 to 2 0 liters) was more effective, giving a 0 2 g protection at an acceleration three to four times that due to gravity, but this is considerably less than that afforded by the pressurized abdominal belts in anti-blackout suits

Effects on Brain

➤ AIRPLANE pilots who fly at high altitudes all day, and day after day, may expect no ill effects on their brain cells unless they go frequently to altitudes of 30,000 feet or more, provided experiments conducted on guinea pigs may be considered as applying to man

In the experiments reported by Drs W F Windle and A V Jensen of the Institute of Neurology, Northwestern University Medical School, animals were placed under atmospheric pressure equivalent to that of 23,000 feet altitude for six hours daily and six days a week until the guinea pigs had run up as much as 500 "flight hours"

Sections of the brain were then examined under the microscope. No evidence was found of hemorrhages or blood vessel changes No alterations in nerve cells were found, or reduction in their number

Other guinea pigs were given 100 hours at 23,000 feet and then another 100 hours at 30,000 feet Although these animals showed no outward sign of brain injury, some areas of softening due to brain anemia were found. No hemorrhages were found in the brains of these "stratosphere flyers" and no generalized condition of abnormality in the brain

Speed of Blood Flow

➤ WHEN YOU ARE RESTING, blood flows through your brain at the rate of about 10,000 drops per minute, the same session learned from a report by Drs Frederic A Gibbs, Harry P Maxwell, Erna L. Gibbs, and Ruth E Hurwitz, of the University of Illinois College of Medicine

If you breathe deeply and rapidly, as the flyers do who are suffering from lack of oxygen, the blood flow will invariably be slowed down If you breathe a high concentration of carbon dioxide the flow will be speeded up

The Illinois investigators clocked the flow of blood through the brain by an ingenious method A two-tenths per cent solution of a dye called Evans Blue was injected at a regular rate into the right internal carotid artery in the neck Blood samples were then taken from the right jugular vein with and without shutting off the right internal jugular vein and from the femoral artery in the thigh The difference in concentration of the dye in the blood from the arteries and from the vein gave the information for estimating the blood flow through the brain

With this information and the difference between the venous and arterial samples in oxygen it is also possible to estimate oxygen consumption

Science News Letter, March 23, 1946

VETERINARY MEDICINE

Buffalo Disease Traced to Filterable Virus

➤ A DISEASE that kills large numbers of water buffalo, most important farm work animals of the warm lands of southeastern Asia, has been identified as an encephalitis with a filterable virus as its cause, by Dr T S Sheng of the National Central University at Chengtu, China (*Science*, Mar 15)

Chinese farmers call the disease "sze-giao-han", which means "four-legs-cold" This comes from the two most noticeable symptoms when an animal is stricken, its owner finds it in the morning with its four legs stretched out stiff, and cold to the touch Shortly afterwards it dies, Dr Sheng states that 95% of all cases end fatally No treatment is known, and no method of prevention

Although the malady is so highly fatal to the animals, it seems to have no terrors for human beings. Dr Sheng and his assistants worked freely among sick animals in the field, and dissected their brains in the laboratory, without even wearing rubber gloves. He adds that in all the cases he has encountered, no human being associated with the dying animals has ever contracted the malady.

Dr Sheng proved the encephalitis to be due to a filterable virus by grinding up diseased brain and nerve tissue taken from dead animals and passing the extract through a germ-stopping filter. The filtrate was able to produce the disease in buffalo, goats and guinea pigs. Attempts to propagate the virus on incubated eggs were not successful

Science News Letter, March 23, 1946

AERONAUTICS

B-50 Superfortress Surpasses B-29

➤ A MORE powerful Boeing Superfortress, a counterpart of the famous B-29 but having increased power and improved flight performance, has been announced by officials of the Army Air Technical Service Command An experimental model has passed flight tests, and the production version is now being built by Boeing Aircraft at Seattle It will be known as the B-50, Superfortress, or the XB-44.

In addition to the increase in horsepower over the B-29, a new-type nacelle has been designed for the XB-44 which enables a change of engine units to be made by six men in a half hour It takes six men eight hours to do the same job in the wartime B-29 The new nacelle contains the engine, supercharger, induction system, oil system and propeller controls.

The new superfortress is powered by four R-4360 Pratt and Whitney engines, with a total of 12,000 horsepower The increase in horsepower over the B-29 comes from the change in the engine installation. The large increase in the available power provides a marked improvement in take-off, rate of climb and speed, Army officials state A four-bladed Curtiss Electric propeller, which has the reversible pitch feature for braking, replaces the previous propeller

Science News Letter, March 23, 1946

HERPETOLOGY

Snake Lays Eggs After Four Years of Confinement

➤ SEVERAL EGGS, at least one of which was fertile, were laid by a snake after living almost four and a half years in solitary confinement, states Hampton L Carson of the department of zoology, Washington University, St Louis.

An adult female indigo snake five feet eight inches long was purchased by Mr Carson in January, 1941, and kept completely isolated from all other snakes Although the snake fed heavily on amphibians, reptiles, birds and mammals, she did not grow perceptibly during captivity

In May, four years and four months after it came into his possession, the snake laid five eggs. They all appeared normal, with turgid, leathery shells.

The eggs were searched for embryos by cutting circular holes at one end and expelling the yolk of each into a finger bowl The first two were examined half-heartedly as Mr Carson really did not expect to find anything The third, however, revealed a small embryo about a fifth of an inch long The embryo seemed normal in every way No embryos were found in the two remaining eggs

This is probably an extreme case of delayed fertilization, the sperm having been stored in the genital tract of the female for at least four years and four months, Mr Carson states The conditions under which the snake was kept during the spring of 1945 differ in no way from those of the four previous springs and there is no obvious explanation of the failure of the snake to lay eggs during the first four years of captivity

Several other cases of sperm storage by female snakes have been reported during the last decade or two, and Mr Carson suggests in a report to the American Society of Ichthyologists and Herpetologists that this phenomenon may exist widely in snakes

Some species which do not have gregarious habits, for instance, should benefit particularly from the capacity to store sperm The three snakes known to store sperm are all warm-climate species that lack the gregarious habits of hibernation characteristics of certain northern snakes and thus have less chance of finding a mate each year

Science News Letter, March 23 1946

ORDNANCE

Rate of Fire Speeded Up In .50-Caliber Machine Gun

➤ THE 50-CALIBER machine gun, chief reliance of American flyers in their air fights during the recent war, has had its rate of fire stepped up by 50%, it is disclosed by Col René R Studler (*Army Ordnance,* Mar-April)

The improved weapon can reach a rate of 1,250 rounds a minute, as compared with a maximum of 850 for the wartime model Of course, no machine gun is fired continuously for as much as a minute But if all 14 forward-bearing guns on a B-25 were to be fired in a combined, one-second burst, they would hurl 280 two-ounce slugs at the enemy during that short period, Col. Studler points out

The new piece is only one and one-half pounds heavier than its predecessor. Improved metals and at least 10 distinct technical improvements account for its radically heightened performance

Science News Letter, March 23, 1946

IN SCIENCE

CHEMISTRY

New Method to Take Pure Oxygen from Air

➤ PURE OXYGEN can be obtained from the air by a relatively simple process developed during the war that uses synthetic chemicals and works on the same principle by which the blood in the human body takes oxygen from the air in the lungs and transports it to the tissues The new method was explained recently at a meeting of the California Section of the American Chemical Society by Dr Melvin Calvin of the University of California

It was observation of this human process and similar natural processes, according to Dr Calvin, that enabled scientists to evolve the new synthetic method of oxygen preparation, which, he said, was first used in the South Pacific to produce oxygen needed for welding and other repair work away from regular repair bases

The process employs an entirely new group of chemicals which belong to a class of compounds called chelates These are made up of metal atoms attached to organic molecules, he explained, the latter usually composed of carbon, hydrogen, nitrogen and oxygen Nature has long utilized chemicals of this type for the essential use and generation of oxygen by animals and plants, such as the green chlorophyll of plants and the hematin that gives the red color to blood, he said

In the new process, one of these chemicals, in the form of red crystalline granules, is placed in a tube and a stream of air is blown through it, he explained "As the red granules absorb the oxygen, they turn black and begin to get warm As they warm up, the rate of oxygen absorption decreases and the total amount of oxygen which they can absorb is decreased, therefore, the tube is cooled by a stream of water around the outside"

After the crystals have absorbed all the oxygen they can, the stream of air is stopped and the cold water surrounding the tube is replaced with hot water or steam, he continued As the crystals are warmed, they give off the oxygen and again become red The oxygen may be collected in a storage tank, and the crystals may be reused thousands of times.

Science News Letter, March 23, 1946

E FIELDS

PHYSIOLOGY

Drugs That Fluoresce Traced Through the Body

➤ DRUGS that fluoresce, or shine with a glow of their own under invisible ultraviolet radiation, can be traced by this means in their course through the body, Dr Charles H Taft of the University of Texas Medical Branch states (*Science,* Mar 15)

Dr Taft chose a quinine derivative, quitenine, because of its intensely purple fluorescence He injected it under the skin of a considerable number of toadfish, and each day killed and dissected a fish, exposing its internal organs to ultraviolet radiation He found that the drug, at first rather generally distributed throughout the body, presently concentrated most strongly in the liver, and to some extent also in the kidneys

Dr Taft states that he is continuing his work on the use of ultraviolet rays as a physiological tracer method

Science News Letter March 23 1946

CHEMISTRY

Protection from A-Bomb Radiations Suggested

➤ GLASS to protect against deadly radiations from exploded atomic bombs was suggested at a section meeting of the American Chemical Society in Detroit, by Prof Alexander Silverman, head of the chemistry department of the University of Pittsburgh The glass recommended is not the ordinary kind, but has a high lead and uranium content, and would be suitable for lining shelters.

"Strange as it may seem," he said, "uranium, which is used indirectly in atomic bomb manufacture, produces a glass which is probably the best protection we have against powerful X-rays and other harmful radiations In post-bombing rescue work, uranium or lead spun-glass garments and helmets lined with these glasses in plate form will permit safe entry into the bombed area Oxygen respirators will be equipped with glass-insulated high-frequency precipitators to keep radioactive dust out of the lungs of the rescue squads"

Prof. Silverman called attention to many new types of glass, and many new uses for them Optical-glass researches, he said, have yielded new products to transmit or absorb radiation of all kinds, noting that reflection and transmission controls make it possible for binoculars to transmit 60% more light than they did before the war He also mentioned a new treatment for mirrors that permits a person to see himself in the reflecting surface and at the same time makes him visible through the glass to a person behind the mirror

Fiber glass and foam glass will have wider uses in the future, Prof Silverman indicated "The heat-insulating value of the former will be utilized more extensively than ever in outdoor clothing and automobile and other vehicle insulation The reinforcing strength of glass fibers will serve in a host of postwar plastic articles," he declared

Science News Letter, March 23, 1946

AERONAUTICS-ENGINEERING

Heating and Ventilating Problems Face Aviation

➤ HEATING and ventilating passenger airliners, particularly those designed for operation at 15,000 feet and over, is a problem on which aviation engineers are now concentrating because of anticipated increased travel by air and the use of high-altitude airlanes

Development has already reached a point astonishing to the land engineer, B M Brod, of American Airlines, told a meeting of the American Society of Heating and Ventilating Engineers in New York, but, he said "the end is not yet, for pressurizing of cabins has raised many problems, some of which are not even as yet recognized"

Heating systems for air transports flying at 15,000-foot altitudes are designed for an outside temperature of 40 degrees below zero, he said Operation at 20,000 feet, anticipated shortly, will require a design temperature of 60 degrees below zero Loss of cabin heat is large because of the thin walls.

Three types of heating systems were described by Mr Brod One is the steam system, in which heat from the exhaust is used in a flash-steam boiler; the second makes use of exhaust heat in a heat exchanger in the ventilating air stream; the third is a gasoline-burning heater

The first system, he stated, is safe but heavy, and requires excessive maintenance, the second is simple and reliable but needs frequent checking; and the third is efficient, light and flexible, but has short life, high maintenance, and requires piping of gasoline to the heater

Science News Letter, March 23, 1946

ENGINEERING

Gas Turbine Engines May Power Ocean Liners

➤ GIANT GAS TURBINE engines may soon be used to power ocean liners and war vessels, following their present successful use in the propulsion of airplanes. They may also be used in locomotives and in central power stations These predictions were made by John R Carlson, Westinghouse engineer, at a meeting of the Washington branch of the Society of Automotive Engineers

Before gas turbines can be used in vessels, a reversible-pitch propeller will have to be perfected to facilitate moving a ship forward and backward, he stated

"Ships now propelled by steam turbines don't need this type of propeller because they are equipped with a reversing element for running astern In forward operation, this reverse element, which is mounted on the same shaft as that which propels the ship forward, spins backward while idling It doesn't absorb much power while rotating because that section turns in a vacuum"

"But the gas turbine," he said, "can't be built in such a way that its reverse element will turn in a vacuum, but must revolve in air of approximately atmospheric density, and thus sets up turbulence and resistance resulting in greater fuel consumption and higher operating costs. There is every reason to believe, however, that this problem will in time be solved"

Chief advantages of the gas turbine, Mr Carlson stated, lie in its simplicity of design and operation, its compactness and relatively light weight Progress in its development was delayed for a long time, he added, by the fact that there were no metals known that would withstand the combination of high temperature and tremendous mechanical forces necessary for such turbines to operate at high efficiency Wartime-developed alloys now meet this requirement, and the way is cleared for greater advancement along other lines

"Widespread use of the gas turbine as a central station power plant is foreseen only when the higher thermal efficiency at higher temperatures of which it is capable, as compared with that of a steam turbine, justifies the added fuel cost," he continued. "At temperatures above about 1,000 degrees, steam turbines rapidly fall off in efficiency, but gas turbines continue to increase in efficiency as operating temperatures rise."

Science News Letter, March 23, 1946

ENGINEERING

Assembly-Line Homes

Prefabricated houses are now mass-produced like wartime ships and planes. Construction engineers believe this type may soon dominate the smaller-home field.

By A. C. MONAHAN

➤ THE FACTORY mass-production methods that so successfully produced giant airplanes, ships and fighting tanks for war are now turning out ready-made homes in increasing numbers for veterans and other home-lovers This type of house, many construction engineers believe, will perhaps soon dominate the smaller-home field and largely replace the conventional on-the-spot constructed house

Prefabricated homes, they are called Many were in use long before the war, but additional thousands were erected during the war to house workers in war industries and servicemen at or near camps The public now knows what factory-built homes are Also the public now has faith in mass-production methods because during the war people learned their value in the rapid and efficient production of war goods

The public seems to be in a frame of mind to think that these methods can be applied in the building industry to help meet the present pressing need for more homes Industrialists are of the same mind, too, for many additional companies have entered the prefabricated homes field Factory buildings where wartime equipment was made are now, in certain cases, being converted for the construction of peacetime homes

Prefabricated homes, which are shipped in sections to the sites where they will be erected, are not necessarily built entirely in the same plant. Various sections can be made in different parts of the country near the sources of materials to be used, but they are precision-made, so that they fit the sections made elsewhere

A metal roof, for example, can be made in a metal-working region to fit a building of wood made where timber abounds During the war large sections of ocean vessels were fabricated far inland and shipped and assembled in shipyards on the coast. Shipyards were largely assembly plants

Prefabricated homes of the present should not be confused with the ready-cut homes of the past. There will probably always be a place for both The ready-cut house is erected on the spot with lumber and other material cut to exact dimensions by machinery in the factory The prefabricated type is built in sections which, at the erection site, are quickly put together permanently with the help of bolts and other fastening devices

Come in Sections

These sections may be an entire sidewall, end wall, half roof or interior partition in a single piece for a very small house, but usually each is made up of several pieces to be joined on the job Even plumbing, heating, kitchen and similar equipment is fabricated in the factory, and shipped to the site with the sections of the building itself, ready to be set in place and connected by simple joining devices

The erection of a completely prefabricated home is a matter of but a few days after the foundation has been laid and outside connections for water, gas, electricity installed exactly where required The heating, kitchen and bathroom sets can be installed and used before the roof is on the house

The erection of homes of factory-prefabricated parts is not a new idea. Thousands of such homes were in use long before the war A well-established industry had been organized, but it greatly expanded to meet war needs, and now is expanding again

Some of these companies made what was known as removable or sectional buildings They were built particularly for movable schools, temporary churches, assembly halls and other one-room structures When no longer needed at one site they could be unbolted and moved elsewhere Thousands were used in city schoolyards to care for overflow school attendance

The American prefabricated homes industry is now so well established, and includes so many different manufacturers, that a monthly journal is published in its interests The journal is not only a "booster" for the industry but a source of information for architects, builders and the public about newer developments in factory-built homes

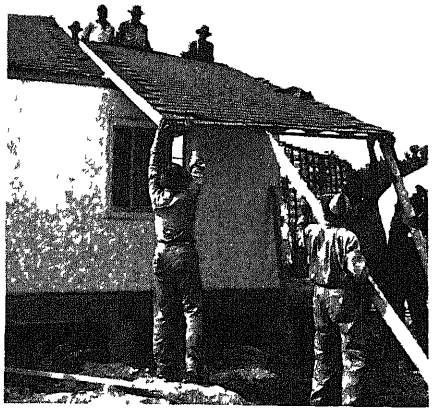
War-developed building materials, and others developed during recent years, lend themselves to the prefabrication of houses particularly because of their lightness and strength, and are contributing to the present boom in this type of construction Included are giant slabs of laminated wood large enough for a one-piece sidewall, new fiberboards, plastics, glass, cement composition ingredients, and the light metals now available and usable because of improvements in the art of welding Metal houses are popular with many

The lightness of these materials is an important factor in the construction of sections that must be shipped and handled in transportation and during erection Lightness alone would be of little value unless strength is combined with it Many of the newer materials have both, and also have other properties essential in home building, such as heat insulation, and resistance to deterioration from weather, corrosion, fire and vermin

Laminated wood is of especial interest Plywood has been used for years for many purposes, but the development of new resins and glues for bonding the thin sheets of wood together, and of an efficient electronic heating method to set the adhesives, makes it now possible to build up boards and beams of almost any size, thickness and shape These laminated woods may be used for outside walls exposed to the weather

A recently developed featherweight material of great strength promises to make a substantial contribution to the prefabricated industry. It is a "sandwich" board with a "honeycomb" of cloth or paper between, and firmly bonded to two thin sheets of wood, or between sheets of aluminum, stainless steel or plastics A practical method of bonding the sheets to the wrinkled honeycomb makes the new material possible It is claimed to have far greater strength than anything of the same weight now being manufactured

Nylon hosiery and transparent raincoats are well-known uses of plastics, but far more important, perhaps, are the plastic building materials, even though these are less familiar. There is now a plastic suitable for almost every household



DEMOUNTABLE—Complete roof panels can be placed or removed from a prefabricated demountable house such as the one of the National Housing Agency shown here.

use, including faucets for the water system, inside partitions, outside walls, roofing, and transparent materials to replace ordinary window panes Some have practically every property required in building and are light in weight as well

A glass fiber-reinforced plastic deserves particular mention because, in addition to great strength, it can be formed into large pieces of various shapes by powered presses The manufacturers suggest its use in one-piece rowboats, or as the whole top of a railroad car The glass fiber reinforcing gives its strength just as steel rods reinforce concrete

While many of the prefabricated homes shown in catalogs are box-like structures, the greater demand will probably be for those of more conventional appearance, perhaps of the favorite Cape Cod type. A house is not a home to many Americans if it varies too far from the familiar structure The box-type prefabricated home is economical to build It fits in well with surroundings in some parts of the country, but a house with the familiar pitched roof is still the favorite

Something very unusual as a modern home is under development in one of the great war aircraft factories, but it has not yet reached the stage of perfection which warrants advertising Economy will be its strongest sales point, it is claimed The sales price may be only 50% to 60% that of prefabricated homes of conventional types

This house, the Dymaxion, it is called, is round in shape, with a domed roof It is made of aluminum and has a window of a transparent plastic running in a strip all the way around it Insulation will keep the inside warm in winter and cool in summer Ventilation is provided by means of the domed top It is a two-bedroom affair, with two baths, and will have the so-called unit equipment in its kitchen and bathroom

Built-in furnishings seem to feature most of the new prefabricated homes They include heating units, kitchen units, bathroom and laundry units, closets, bookcases, and even beds that store away in the walls during the day

Typical is a kitchen unit mounted on a base less than eight feet long and narrow enough to be rolled through a door When set in place, it is fastened to the wall A few turns of a stillson wrench connects it to the utility outlets, and it is ready for use It contains a stove, refrigerator, sink, work table and, overhead, cabinets for kitchen utensils It is the modern prefabricated kitchen for the modern prefabricated home

Science News Letter March 23, 1946

PHYSICS

Atomic Scientist Warns Against Misinterpretation

➤ WARNING AGAINST misinterpretation of the experimental atomic bombing of Navy ships at Bikini atoll this spring and summer, Dr Norris E Bradbury, director of the Los Alamos Laboratory of the Manhattan Engineer District, said, "The test is not designed to determine conclusively the extent or character of our future naval construction, or to detract from the already fearful potentiality of the bomb as it might be used in another war"

Fearing that too much emphasis has been placed on the number of ships to be used in the operation, Dr Bradbury explained that many of the ships used will not receive serious damage

"Many are to carry important instruments which will record data necessary to interpret properly the results of the test," he pointed out

"The aim of the test," he declared, "should not be to see how many ships can be destroyed and sunk, but to obtain objective and factual information from ships at varying distances with all degrees of damage"

Dr Bradbury said two difficulties in the test will be the danger of fires that might normally be put out by personnel aboard a ship, and the fact that the ships will be closer together than in a tactical formation

The atomic scientist warned against misinterpretation of the results of the bombing damage, pointing out that the important effects of radioactivity and radiation can only be determined by technical measurements

"Only by the most careful, unbiased and technical interpretation in military and naval circles, in the offices of overall military strategy and in the public press can the test be given its proper weight and meaning," declared Dr Bradbury

"Nor," he added, "should the people of this country ever forget the appearance of Hiroshima and Nagasaki after only one atomic bomb"

Science News Letter, March 23, 1946

Approximately 50 American *agricultural crops* depend upon honeybees for pollination

Spectrographs, which determine elements in kind and amount by measuring ultraviolet ray lengths, have been found particularly useful in plant and poison analysis by agricultural chemists; samples are burned to emit the rays

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Raw silk was produced in Virginia in 1622

Bees sometimes rob honey from other hives rather than hunt for nectar

Oysters may pass as much as 50 gallons of water through their gills in a day, though the amount is usually nearer 10 gallons

Gasoline is not one chemical compound but comprises many different hydrocarbons; their nature and amount determine the behavior of the fuel in an engine

The *white-fringed beetle* of South America, introduced into Florida in 1936, has become a menace to peanuts, yams, cotton, and other plants in Louisiana, Mississippi, Alabama

The *puff adder,* a common snake in America, is one of the world's biggest bluffers; when cornered it spreads its head cobra-fashion, or opens its mouth as if to strike, which it sometimes does —but with its mouth closed

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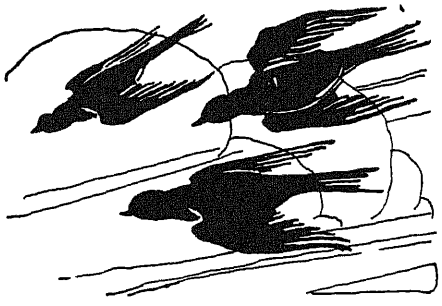
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ORNITHOLOGY

NATURE RAMBLINGS by Frank Thone



Returning Birds

➤ THE SWALLOWS of Mission San Juan Capistrano, at first a California institution, have now assumed the proportions of a national legend. On exactly the same date each spring, local observers declare, the arrowy flocks come in a twittering rush, to reestablish their homes. They are not supposed to deviate by so much as a day from the established calendar.

In southern California's stormless springtime such clocklike punctuality may be possible. In the East, where spring weather is gustier and less dependable, and where a relapse into winter may occur any night, bird arrivals are more irregular. Yet even in that less favored region the dates of the first robin, the first bluebird, the first oriole may be forecast within a week or so with some degree of surety.

Birds really do fly by the clock—the oldest clock of all, the one by which all man-made timepieces are set, the sun. At about the time the farmer says, "Days are getting quite a bit longer, I'd better look over my plows," the birds in their southern winter homes are also feeling the urge to be on the move about their business.

There is no conscious response to the lengthening of daylight hours, as in the case of farmers and other folk whose activities are season-governed. The increasing length of day itself is the stimulus, according to the theory at present most widely accepted. The larger daily doses of light in some way change the internal chemistry of the bird's body, arousing the migration impulse. In similar fashion, the shortening days in autumn set in motion the southward migration.

Experimental support for this seemingly fantastic notion was first produced by a Canadian ornithologist, Dr. William Rowan of the University of Alberta. He caged birds of various species in autumn, and subjected them to artificially lengthened days by means of electric light, as if spring, not winter, were coming. When he released them the bewildered birds started north!

Another Canadian-born naturalist, now an American citizen, Dr. T. Hume Bissonnette of Trinity College, Conn., demonstrated a connection between lengthening daylight and the reproductive cycle in birds, and in mammals also. Since springtime daylight hours arouse in birds the mating and nestbuilding instincts, it can only be expected that they will then move swiftly to the northern homesites where they are used to building their nests.

Science News Letter, March 23, 1946

NAVIGATION

Revision Proposed For Nautical Almanac

➤ REPORTING on a study of methods used by merchant marine navigators during the war, Col. George W. Mixter, author of several textbooks on navigation, proposed a new revision of the time-honored *Nautical Almanac* at the annual meeting of the Institute of Navigation in Washington, D. C.

Designed to incorporate the more simplified forms of the present *Air Almanac* for use in surface navigation, the new edition proposed by Col. Mixter would have fewer tables than the present system uses.

Col. Mixter said that his survey had showed that the Air Almanac has found great favor among ship captains and navigators though it is not required for licensing examinations and is seldom taught.

He said that the proposed change would not decrease the accuracy of figures obtained and would be faster and more convenient for navigators.

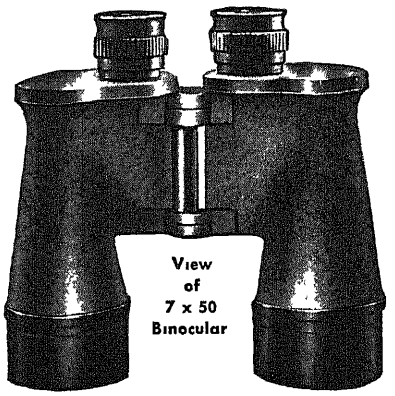
The present *Air Almanac* is designed for rapid calculation in flight and is not as minutely accurate as some of the surface navigation tables. Col. Mixter's suggested nautical almanac would have the air edition's tables plus declination and Greenwich hour angle figures down to tenths of minutes.

Science News Letter, March 23, 1946

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MEDICINE

Chemical Fights Disease

War gas unused in World War II gives hopeful lead for attack on Hodgkin's disease and lymphosarcoma. 150 already treated with these agents.

➤ HOPE FOR a chemical conquest of cancer-like conditions such as Hodgkin's disease and lymphosarcoma appeared in a report by Maj Alfred Gilman, of the medical division of the Chemical Warfare Service, Edgewood Arsenal, at the meeting of the Federation of American Societies for Experimental Biology in Atlantic City

The chemical warfare agents which gives this hope are the nitrogen mustards Some 150 patients, about half of them with Hodgkin's disease, have already been treated with these agents

The nitrogen mustards produce the same effects as X-rays in Hodgkin's disease. Patients have, as they do with X-ray treatment, what doctors call remissions They get better, but they are not cured

Maj Gilman stressed that Hodgkin's disease patients should not be disappointed because they cannot yet get this treatment The nitrogen mustards do no more, except in a few rare cases, than good X-ray treatments The exceptions are those rare cases that are X-ray-resistant but which are helped by the nitrogen mustards

The hope is that new nitrogen mustards can be synthesized which will be even more effective

Maj Gilman does not think that even then a cure for Hodgkin's disease will be produced, but that the treatment may be so improved that patients' lives can be prolonged 15 or 20 years

Any chemist with imagination could make literally 500 nitrogen mustards, Maj Gilman said About 50 to 100 are already available By further trials of these compounds alone and in combination with X-rays the scientists of the Chemical Warfare Service and at hospitals where the compounds are being tried hope to find an effective remedy for Hodgkin's and for lymphosarcoma

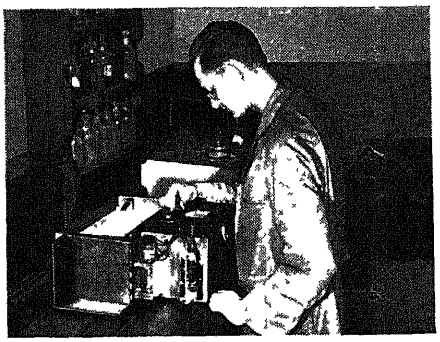
The nitrogen mustards are not effective in any other cancer-like disease Trials in leukemia were very disappointing

The compounds act on the cell nucleus and have a selective effect on cells of the body which multiply most rapidly

Discovery of the remedial action of the nitrogen mustards was made long before the reported experience of shipwrecked men in Bari harbor whose body cells suffered changes after swimming in a sea into which was spilled nitrogen mustard gas In the fall of 1942 Maj Gilman, then at Yale University, and Dr. L. S Goodman, now at the University of Utah, and Dr G E Lindskog of Yale, began investigating their effects on the body During the last war the skin-blistering, eye-burning effects of mustard gas were chiefly recognized But Dr C. Lushbaugh of the University of Chicago, among others, saw that mustards, especially nitrogen mustards which penetrate the skin very well, had other more general effects on the body and affected the bone marrow

A year before the Bari incident, the Yale group were treating three lympho sarcoma patients with nitrogen mustard These patients were dying The X-rays no longer could help them Nitrogen mustard treatment was given too late and not in proper dosage to save them but it did prolong their lives for three months The results were sufficiently encouraging, however, to continue the work of nitrogen mustards as a remedy

Science News Letter, March 23, 1946



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CHEMISTRY

Rapid Method of Making Rubber in Germany

➤ A NEW, rapid method of making rubber and a new formula for synthetic rubber were two of the finds made in Germany by an American committee of six chemists and rubber experts who visited Europe in the fall in 1945, sent by the Federal Office of Rubber Reserve These scientists recommend these two findings to the American rubber industry

The new rapid method of making rubber, the Redox method, is a process that can be completed, they state, in two to three hours instead of the 12 to 14 hours usually needed It may prove, they claim, a step toward a continuous process of making rubber

The new formula for synthetic rubber, labeled "Buna S4," gives a material that requires less heat-softening than other German synthetic rubbers because it uses chemicals in a manner similar to American rubber, though developed by a different approach.

The committee was headed by Prof Carl S Marvel of the University of Illinois Other members included Ensign Edward R Weidlein Jr, Albert M Clifford of the Goodyear Company, John N Street of Firestone, Harlan L Trumbull of Goodrich, and George R Vila of United States Rubber

One major difference between American and German synthetic rubbers, they said, is that American plants making rubber use a chemical which makes the product both softer and easier to handle The Germans do not use this chemical, but depend upon heat to soften the rubber for processing German chemists told the committee that they use the heat method because it was the first method developed and because they had the equipment with which to carry it out Also, they said, they wanted to make one synthetic usable for various purposes

Science News Letter, March 23, 1946

• Books of the Week •

ANALYTIC GEOMETRY—Francis D Murnaghan—*Prentice-Hall,* 402 p, diagrs, $4 35 An introductory textbook developing the subject from the point of view of vectors and matrices

COTTON MAGIC—Mildred Gwin Barnwell—*Jacobs Press,* 114 p, illus, $2 A simple and complete description of cotton manufacturing, containing a useful glossary of textile terms

COUNSELING WITH RETURNED SERVICEMEN—Carl R Rogers and John L Wallen—*McGraw,* 159 p, $1 60 A manual for those who are undertaking counsel ng responsibilities Counseling is defined as a process by which the serviceman talks out his problem and comes to understand himself and the problem and sees more clearly the steps which he can independently take toward its solution

DISCUSS ON OF A PHOTOGRAMMETRIC METHOD FOR CONSTRUCTING TOPOGRAPHIC MAPS FROM AERIAL PHOTOGRAPHS—Earl Church—*Syracuse Univ,* 16 p, diagrs, free No 16 in a series on aerial photogrammetry published by Syracuse Univ

DYNAMICS OF PACKAGE CUSHIONING—R D Mindlin—*Bell Telephone System,* 109 p, charts and diagrs, free A mathematical analysis of the means of predicting the efficacy of protective cushioning in the transportation of packaged articles

ELECTRONICS FOR ENGINEERS Reference Articles, Charts, and Graphs from Electronics Magazine—John Markus and Vin Zeluff—*McGraw,* 390 p, charts and diagrs, $6 Material representing condensed information in graph and chart form which has been in great demand for the reference use of engineers engaged in designing circuits, equipment for radio, and electronic, television, radar, sound and related vacuum-tube apparatus

HEARINGS ON SCIENCE LEGISLATION (S 1297 and Related Bills) Part 5—*Senate Committee on Military Affairs*—278 p, free Testimony given by Dr Henry Allen Moe, John Milton Potter, James B Conant, Ralph W Tyler and others This publication is interesting because of its relation to bill S 1850 which deals with science legislation

EXERCISES IN HUMAN PHYSIOLOGY Preparatory to Clinical Work—Sir Thomas Lewis—*Macmillan,* 103 p, diagrs, $1.25 Practical classroom experiments for the medical student

EXPERIMENT MANUAL FOR ELECTRONIC DEMONSTRATION—Sol D Prensky—*Radiolab Pub. and Supply Co,* 60 p, diagrs and illus, $2 Suggestions and detailed descriptions for performing modern classroom demonstrations with electronic test equipment

GEODETIC AND PHOTOGRAMMETRIC PROBLEMS IN CONNECTION WITH THE MAPPING OF A NEW COUNTRY—Jose Fonseca and Leon Cuellar—*Syracuse Univ,* 80 p, maps and diagrs., free No. 10 in a series of special bulletins on aerial photogrammetry published by Syracuse Univ

GOVERNMENT ASSISTANCE IN EIGHTEENTH CENTURY FRANCE—Shelby T McCloy—*Duke Univ Press,* 496 p, $6 The story of the catastrophes and suffering which visited the French people in the eighteenth century and of the attempts of the government to eradicate the evils by providing various kinds of education and assistance in hospitals, asylums, refuges, and pensions A volume which should appeal not only to the social historian but also to the historian of economics, medicine and education

GUIDE TO SOUTHERN TREES—Ellwood S Harrar and J George Harrar—*McGau* 712 p, illus, $4 50 Full, simple descriptions of more than 350 arborescent species native to the southern states, together with a review of the important botanical features of leaves, flowers, fruit, bark, etc

FREEZING TO PRESERVE HOME-GROWN FOODS—H C Diehl and K F Warner—*Dept of Agric,* 62 p, illus, 15 cents Specific instructions for the preservation of meat, butter, sea food, vegetable, fruit

INFLATION AND THE AMERICAN ECONOMY—Seymour E Harris—*McGraw,* 559 p, tables, $5 A comprehensive study of our war and postwar economy, and in particular of the relation of supply and demand to the price structure, with special emphasis given to an evaluation of those forces tending toward inflation or deflation

JOURNAL OF COLLOID SCIENCE—Victor K LaMer, Editor-in-Chief—*Academic Press,* Bi-monthly, $10 a year

MACHINE-TOOL WORK Fundamental Principles—W P Turner, revised by H F Owen—*McGraw,* 364 p, tables and illus, $3, 2nd ed The fundamental problems that are common to all kinds of machine-tool work, including the lathe, planer, shaper, milling machine, drilling machine, etc New edition contains chapters on Shop Safety, Broaching, and Measurement

NEW DRUGS—Arthur D Herrick and Austin E Smith—*Revere Publ,* 303 p, tables, $4 Information regarding the legal and research procedures which must take place before a new drug may be released for general use, a book which will be of use to the pharmacologist, the chemist developing and testing new drugs, those concerned with product marketing, and their legal counsel

A PSYCHIATRIC PRIMER FOR THE VETERAN'S FAMILY AND FRIENDS—Alexander Dumas, M. D, and Grace Keen—*Univ of Minn Press* 214 p, illus, $2 A valuable supplement to the personal treatment and counseling of veterans, written for the non-professional reader

SOUTHERN CALIFORNIA COUNTRY—Carey McWilliams—*Duell,* 387 p, $3 75. A history of Southern California packed with significant information about its famous personalities, the early days of the missions, the origins of Hollywood, and a hundred other subjects

Science News Letter, March 23, 1946

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⚙ *HEATED steering wheel cover, to keep an automobile driver's hands warm in cold weather, fits closely the rim of the wheel and is made of leather, rubber or fabric within which a heating coil or heating element is embedded The heater is connected to the car's electric ignition system*

Science News Letter, March 23, 1946

⚙ *COAXIAL SPEAKER, particularly for frequency modulation, or FM, reception and high quality phonograph reproduction, consists of two units, each reproducing a portion of the total frequency range It has a compression-type high-frequency unit attached to the back of a direct-radiator low-frequency unit.*

Science News Letter, March 23, 1946

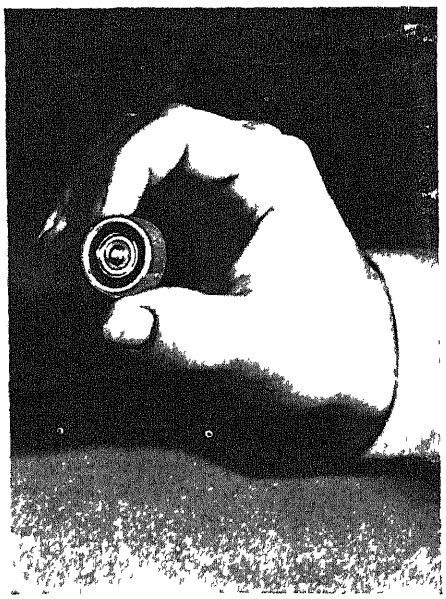
⚙ *JET-PROPULSION top, a toy, is spun by compressed air escaping through nozzles on its outer surface Inside the globe-shaped affair, its perpendicular axis is a compression pump which is manually operated by an outside knob on the upper end of its piston The globular body holds the compressed air*

Science News Letter, March 23, 1946

⚙ *DISAPPEARING stairway fits snugly into the ceiling of a room between regular joists It is mechanically attached by levers with a trapdoor in the floor above in such a way that opening either one opens the other The combination, counterbalanced for ease in operation, is held in either position by gravity*

Science News Letter, March 23, 1946

⚙ *TINY DRY BATTERY that powered the "handie-talkie" used by Army*



Signal Corps has now been developed into the commercial model shown in the picture, used principally in hearing aids. Chemical reaction of zinc and mercuric oxide operates the cell, conventional cells use zinc and carbon

Science News Letter, March 23, 1946

⚙ *SAFETY RAZOR that floats has a hollow bulbous plastic handle containing a sealed volume of air It is designed for campers who use the smooth surface of a lake for a shaving mirror.*

Science News Letter, March 23, 1946

⚙ *MAGNESIUM gravity conveyors of the roller type weigh less than half as much as steel conveyors of the same strength Made in 10-foot units weighing 68 pounds, they are easily combined into long conveyors in industrial plants where longer ones are needed*

Science News Letter, March 23, 1946

⚙ *METAL wastebasket that smothers out a fire accidentally started in it has double open downward-projecting lids covering the outer part of the circular top. These accumulate the carbon dioxide from a fire in its early stage and use it to prevent further oxygen from reaching the flame*

Science News Letter, March 23, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St, N W., Washington 6, D C, and ask for Gadget Bulletin 303

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Question Box

AERONAUTICS

In what ways does the B-50 surpass the B-29? p 184

CHEMISTRY

What is the Redox method? p 190

What protections against A-bomb radiations are suggested? p 185

ELECTRONICS

What is "wind-finding" equipment? p 180.

ENGINEERING

What further uses for gas turbine engines have been indicated? p 185

HERPETOLOGY

What snake laid fertile eggs after four years of confinement? p 184

MEDICINE

How can the effects of atomic bombing on the blood, disease resistance and reproduction be determined? p 179

How have drugs that fluoresce been traced in their course through the body? p 185

What chemical may become effective against cancer-like diseases? p 190

What has been found to be the cause of the disease which kills large numbers of buffalo? p 183

What new glaucoma weapon is suggested? p. 181

Why may penicillin and streptomycin be useless in five to ten years? p 182

PHYSIOLOGY

How could bathtubs keep pilots from blacking out? p. 183.

Where published sources are used they are cited.

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SCIENCE NEWS LETTER

Vol. 49, No. 13

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 30, 1946



Television From The Sky

See Page 195

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946

MEDICINE

New Antiseptic Solution

Acts through hydrogen peroxide. Used for wounds and ear, nose, throat and lung infections; tried in over 800 patients.

➤ A NEW TYPE of antiseptic solution for use in wounds and in eye, ear, mouth, throat, lung and skin infections is reported in the *Annals of Allergy*, (Jan.-Feb.), official publication of the American College of Allergists, Dr. Fred W. Wittich, secretary-treasurer of the college, announces.

The new antiseptic, called thenardol, was developed by Dr. Ethan Allan Brown of Boston and his colleagues. The antiseptic effect of thenardol is due to hydrogen peroxide, the household first aid for cuts of a generation or two ago.

In theory, it is explained, hydrogen peroxide is the safest antiseptic substance available since its end-products, water and oxygen, are non-poisonous and non-irritating, and do not cause allergic reactions. It is relatively non-selective bacterially, that is, it acts on all kinds of germs, and is also deodorizing, cleansing and will stop bleeding.

Hydrogen peroxide, however, does not stand up well in storage and its action when in contact with wound surfaces is transient. Dr. Brown and his collaborators overcame these disadvantages by using urea peroxide as a source of hydrogen peroxide. Dissolving urea peroxide in anhydrous glycerol gave them a stable solution for storage purposes as well as a new type of antiseptic for use on wounds or infected skin and the like.

The solution can also be used as an aerosol, or mist, in contact with tissue fluids. This makes possible its use by inhalation for lung infections.

The first patients on whom it was used were either sensitive to sulfa drugs or penicillin or suffered from mixed bacterial infections resistant to either type of medication. Especially gratifying were the results in middle ear infections, mouth infections, and empyema.

Thenardol was named for Louis Jacques Thenard, the French scientist who discovered hydrogen peroxide.

Its action is explained as follows. The urea peroxide decomposes into urea and hydrogen peroxide. Tissue peroxidase, an enzyme in the body, then acts upon the hydrogen peroxide to form water and oxygen. The oxygen, trapped by the glycerol, churns it continuously, renewing the interface between the antiseptic and the wound surface and forming an oxygenated cream. The remaining urea, itself germ-stopping, peptises dead tissue and hastens wound healing. Oxine, the secondary stabilizer, is also germ-checking. The glycerol, which does not dry, is viscous and remains where placed. It is hygroscopic, so that it draws plasma from the deeper parts of wounds, not only washing out bacteria but diluting toxins and irritants.

Science News Letter, March 30, 1946

AERONAUTICS

Largest Wind Tunnel

Will test steel models of guided missiles and jet and rocket aircraft at twice the velocity of sound. Is in use at Moffett Field, Calif.

➤ A 1500-MILE-AN-HOUR wind tunnel, the largest in the United States, designed to conduct tests upon models of guided missiles and jet- and rocket-propelled aircraft, is now in use in the Ames Laboratory of the National Advisory Committee for Aeronautics at Moffett Field, Calif. The new supersonic wind tunnel is designed to operate exclusively above the present limit of human flight imposed by the same phenomenon, the velocity of sound, which is approximately 760 miles an hour.

The tunnel will be used to conduct fundamental research to obtain knowledge of the design requirements for stable and controllable flight at the tremendous speeds made possible by recently perfected systems of propulsion.

Steel models will be used in the tests. They will be accurately made, and will be mounted in the three-square-foot test section of the supersonic tunnel. Air is forced through this restricted channel at velocities as high as twice the speed of sound, simulating the conditions encountered by a supersonic aircraft. Power is supplied by electric motors totaling 10,000 horsepower, driving four three-stage centrifugal compressors which rotate at a constant speed of 5,350 revolutions per minute.

Variation of the scale of flight is achieved by changing the pressure inside the tunnel from a near-vacuum up to almost three times atmospheric pressure. Sensitive regulators maintain the pressure automatically. Humidity in the tunnel is accurately controlled by means of air-driers, which can reduce the moisture content inside the tunnel to as little as 1% of that of normal atmosphere.

Another supersonic tunnel, now nearing completion at the same laboratory, will extend the available range of supersonic testing speeds to an extreme of 3.6 times that of sound for short periods of time, NACA officials announce. This means a velocity of more than 2,600 miles an hour. It will have a test section identical with the electrically-driven tunnel to permit interchange of models, but it will operate intermittently from a huge pressure tank. All observations will have to be made within about 10 minutes, in which time the entire supply of high-pressure dry air is exhausted.

Science News Letter, March 30, 1946

ORDNANCE

Japs Copied Garand Rifle; Failed to Manufacture

➤ THE GARAND RIFLE received the sincerest of flattery—imitation—from the notoriously copy-minded Japs, it is disclosed in *Army Ordnance* (Mar.-April). A semi-automatic weapon that was an almost exact copy of the American firearm was developed during the closing days of the war, but lack of material and industrial disorganization prevented quantity production.

An American war materiel recovery team found 100 of the rifles in the Washimo Seiki Sawania factory, in the Nagoya area.

The Japanese version of the M-1 differs chiefly in its lighter weight, due mainly to the use of a different kind of wood in the stock, and in having a caliber of 303 instead of 30 inch, to take the standard Japanese 7.7-millimeter cartridge. The rear sight also is different, and the magazine holds only five rounds instead of eight.

Science News Letter, March 30, 1946

ELECTRONICS

Airborne Television

It gave the Army and Navy "eyes" in remote-controlled aircraft during the war and now promises revolutionary peacetime developments.

See Front Cover

➤ NOW IT IS "walkie-lookie" Airborne television, that gave the Army and Navy "eyes" in remote-controlled aircraft and other important weapons for victory, was demonstrated to the public with a promise of many revolutionary developments from the use of television in peacetime airplanes

Two systems of aerial television, known during the war as "block" and "ring," were shown to the press at the Naval Air Station at Anacostia, D C, by Navy and Radio Corporation of America engineers who worked on the projects. The official U S Navy photograph on the cover of this SCIENCE NEWS LETTER shows the way a moored blimp looked at a "ring" television receiving station eight miles away from the plane at the time of the transmission.

"Ring" equipment transmits clear television pictures from up to 200 miles, while a more compact unit, the "block" system, is a smaller installation for use over shorter distances

"Walkie-lookie," the picture equivalent of the small remote voice instrument known as "walkie-talkie," will come from the "block" system's light-weight, easily portable television camera, according to Brig Gen David Sarnoff, president of RCA He predicted literal eyewitness news coverage for events in the future with the small camera

Other predicted peacetime developments from the war's airborne television equipment include

1 Television test pilots in experimental aircraft to eliminate the risk of life Airborne systems could not only transmit views of the plane's surroundings, but also give controllers on the ground a continuous picture of the plane's instruments.

2 Sight transmission of weather and traffic conditions to air pilots and marine navigators

3 Television eyes for industry and science that will present pictures of operations or experiments to distant observers Thus, dangerous work such as that involved in many phases of atomic energy investigation might be seen "close up" by observers at a safe distance

4 Airborne exploration of hazardous regions with remote-controlled aircraft using television

5 Numerous commercial applications such as the use of television to provide visual stimulus to travel enterprises

In the war, the Army and Navy used "block" and "ring" for many important life-saving duties These television systems were used to guide both pilotless aircraft and surface boats, and explosive-laden bombers and crash boats could be sent against the enemy for "direct hits" accurately controlled by distant operators

Television, the Navy revealed, guided free-falling, radio-controlled aerial bombs, flying torpedoes, assault drones and pilotless explosive gliders

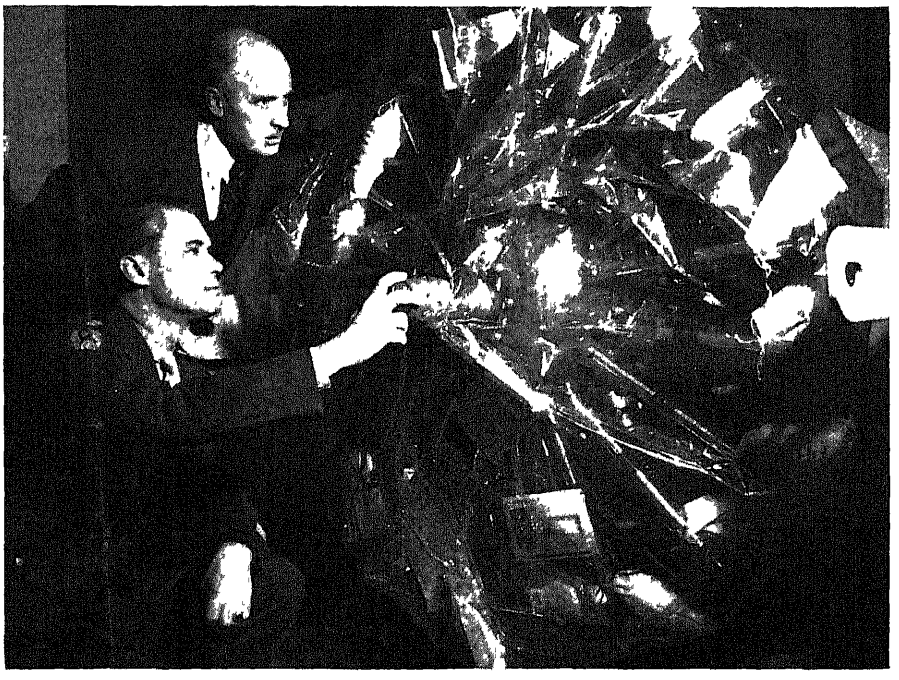
Eyewitness views of many hazardous positions came to remote headquarters through television cameras in important operations, Navy experts reported In amphibious landings, reconnaissance and gunfire were reported vividly from the spot of action by television, while observation planes for artillery spotting, gun control, map making and other important jobs used "block" or "ring" cameras

Visual word messages, maps and charts were sent at high speed between ships and aircraft and from one part of a ship to another during battle by Navy television installations, it was explained

The Army and Navy used visual cameras to record tests of equipment that required perilous conditions of experiment

Both the Army and Navy used the "block" system during the war, while the long-range "ring" television equipment was produced in the latter stages of the conflict

The names "block" and "ring" were used as code names to protect the projects, and the first work on airborne television was done under the unrevealing title "Jeepette" "Block" used on Navy gliders became "Glomb" and on overage bombers used to fly remote control missions was called "War Weary" Navy



WASP ENGINE PROTECTED—Dr. Henry Butler Allen, secretary and director of the Franklin Institute, explains the protective refinishing of the Wasp No. 1 engine to Lieut. Gen. Hoyt S. Vandenberg. Through the moisture-proof wrapping of pliofilm can be seen the numerous bags of protek-sorb silica gel and (lower center) a humidity indicator.

crash boats with television eyes were designated as "Campbells," while the television system for guided bombs was "Roc"

Important future military uses of the new equipment include a combined photo-television communication system. Transmitting 100 words in less than one second, this communication operation would give almost instantaneous copies of television messages by automatic photographing Photographs or charts could be sent in the same way This system could be used up to 20 miles, the Navy said.

In naval operations, pilots on several aircraft carriers could be briefed for missions from one control room, while oral instructions and orders that might be confused in noisy locations can be clearly understood using a television screen

Future marine surveys, observations of fish life and salvage operations will probably use television equipment, the Navy revealed

Science News Letter, March 30, 1946

ENTOMOLOGY

Insect Fifth Columnists

The female ichneumon fly lays her eggs in the larvae of other insects, and the grubs devour the vitals of their living prey.

➤ FIFTH columnists of the insect world, that attack other insects by very literal boring-from-within tactics, were described before a special meeting of the Washington Academy of Sciences by Dr. Henry K. Townes of the U. S Department of Agriculture At the meeting, the Academy's Awards for Scientific Achievement were presented to Dr Townes, Dr Robert Simha of the National Bureau of Standards and Kenneth L Sherman of the Carnegie Institution of Washington

The insect allies of the human race studied by Dr. Townes are known as ichneumon flies, though they are more nearly related to wasps than to flies. They are rather small, few of them being more than half an inch long, but their attack on other insects is deadly The female lays her eggs in the eggs or larvae of other insects, and when the grubs hatch out they devour the vitals of their living prey A few species prey on spiders—a case of man-bites-dog in the insect world

Dr Townes made a new classification of all forms of ichneumon flies known in the United States and Canada. He estimates that in this area there are some 8,000 or 10,000 species in the group, of which only about 2,500 have thus far been named

Air Electricity

➤ THERE'S electricity in the air, even when lightning is not flashing, Mr Sherman told his listeners A current of something like 2,000 amperes is continuously flowing into the earth, and nobody has yet found an explanation for it

At the Carnegie Institution's Terrestrial Magnetism Laboratory, Mr. Sherman and his colleagues work constantly at measuring this fair-weather atmospheric electricity, and at developing better methods and improved apparatus for the work Some of the instruments are of almost incredible delicacy a vital part may consist of a fiber of spun fused quartz, finer than a cobweb thread yet thinly coated with metal They are of corresponding sensitiveness; the speaker stated that "as many unit charges flow through an ordinary light bulb in one second as we would accumulate in our conductivity apparatus in 100,000 years"

Molecules in Plastics

➤ THE STRENGTH and elasticity of synthetic plastics like GR-S rubber and nylon depend on the size and shape of the molecules, Dr Simha stated Molecules of these substances are huge, with molecular weights in the tens or hundreds of thousands, as compared with molecular weights in mere tens or hundreds for such simple substances as water and alcohol These molecules are long and narrow, and normally coil like snakes, which is what gives them their high degree of "stretch and spring"

Since even these big molecules cannot be observed directly, their properties have to be determined by what they do They are permitted to diffuse through and settle down in liquid media, and the rates measured They are stirred with instruments that measure their resistance to stirring In these and other ways the sizes and shapes of their molecules can be determined, and plans can be made for the construction of even longer, curlier and better synthetic molecules

Science News Letter, March 30, 1946

Crisp light-brown *salted wafers* with a slight cheese and toasted potato flavor may be made from potatoes and skim milk, following a simple method developed by government dairy experts

"Ladybug prospectors" hunt hidden hordes of hibernating ladybugs for shipment to orchard and garden regions where they are released to feed on such agricultural pests as aphids, red spiders and potato beetle eggs

SCIENCE NEWS LETTER

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METALLURGY

Metallic Titanium Uses

May become as widely used as aluminum and magnesium because it is possible to extract a relatively pure ductile titanium from its natural ores.

➤ METALLIC TITANIUM, a strong light metal, may become perhaps as widely known and used as aluminum and magnesium because of methods perfected by the U S Bureau of Mines, making possible the extraction of a relatively pure ductile titanium from its natural ores

The process can be expanded and used on a large scale, Bureau officials state Titanium ranks fourth in abundance among metallic elements suitable for engineering purposes

Titanium has long been known and used; not, however, as a metal but in its compounds Titanium dioxide, the mineral rutile, is used in large quantities as a pigment in paint because of its great whitening power It is also used in rubber, linoleum, leather, plastics, soap, printing inks, paper, textiles, and ceramics Certain alloys are also of importance, particularly ferro-carbon-titanium, which is used in the steel industry, and titanite, an aluminum-manganese-titanium alloy that takes a high, corrosion-resistant polish.

The successful method of producing ductile titanium by the Bureau of Mines was described at a meeting of the American Institute of Mining and Metallurgical Engineers by R S Dean, assistant director of the Bureau, and J. R Long, F S Wartman and E L Anderson, metallurgists or chemists of the Bureau

The method involves reduction of titanium tetrachloride by a more active metal and yields titanium in a granular or powdered form It follows in general what is known as the Kroll process The active metal used is magnesium, and the reaction is carried out at a temperature of about 800 degrees Centigrade

The reaction mixture, they state, consists of titanium, magnesium chloride, and unreacted magnesium After cooling it is crushed and leached The resulting granular titanium is ground wet, releached to remove the magnesium, dried, and consolidated by powder methods or by a special arc process

The titanium powder produced was compacted into small pellets at a pressure of 100 tons per square inch and heat-treated or sintered at 1000 degrees Centigrade in a high vacuum After this treatment the compacts were usually malleable enough to withstand considerable cold deformation

In an expansion of the process, great enough to produce 15 pounds of titanium in a single batch, various changes in apparatus and techniques were found both necessary and desirable. One of these, Mr. Dean said, was the use of an unlined iron pot instead of the molybdenum-lined pot initially used. Several methods of grinding the titanium were tried One was in a small hammer mill operating in an atmosphere of helium to prevent oxidation of the titanium particles A wet grinding process, with frequent screening to remove undersize particles, was finally used

Science News Letter, March 30, 1946

GENERAL SCIENCE

Dispute Is Delaying Peacetime Atomic Energy

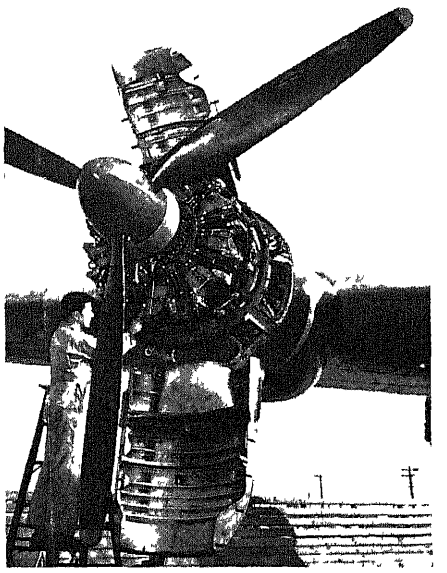
➤ PEACEFUL development of atomic energy is being delayed by legislative disputes over its control, Dr Vannevar Bush, president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development, charged in a press conference

Terming the delay unfortunate, Dr Bush, who was a leading figure in the development of the atomic bomb, declared that a civilian control commission for atomic energy should be established with "plenty of authority"

Asserting that there is general agreement that control of atomic energy should be civilian, he said the question of military men serving on the commission was not a fundamental problem

"We should make it clear from the outset that we want civilian control," Dr Bush said, adding, "the military must have an interest in atomic energy, but not control"

Urging a commission made up of the most able men possible, he advocated that the group should have full discretion to decide what details of atomic energy should be released to the public and how far industry could go in its use.



***SAVES TIME**—Gaping metal jaws frame the 2500 horsepower Wright engine of the Lockheed Constellation as a mechanic makes a minor adjustment. Ground crews who have worked with the new type cowling say that as much as 15 to 20 minutes is saved every time an engine must be serviced or inspected. This saving in time will be passed on to Constellation airline passengers in reduced ground time during scheduled flights.*

He denied that rigid government control would retard private developments and cited the regulation of narcotics manufacture and distribution as an example of private enterprise working under stiff government rule

Dr Bush said the Office of Scientific Research and Development is "still carrying on a small bit of research," and he hoped that this could be carried on by the proposed National Research Foundation which he favors.

The proximity fuze rather than the atomic bomb received Dr Bush's nomination as the wartime weapon that "took more resource and courage than any other scientific development"

Describing the problems of producing the fuze as a radio station that could be fired from guns and turned out by the millions, he praised the scientific work on the fuze as a job that did the impossible

Science News Letter, March 30, 1946

ORDNANCE

Counter-Attack Rockets

May be defense against attack by jet-propelled missiles. Army to seek protective methods in experiments with German V-2's this summer.

➤ "COUNTER-ATTACK" rockets sent up to explode enemy jet-propelled missiles harmlessly in mid-air may be the answer to the problem of a defense against attacks from the sky in a future war, believe Army experts who will conduct tests of captured German V-2 weapons at the White Sands, N Mex, proving grounds this summer

Every known method of radar detection, including the now-famous "moon-radar" equipment, will be used to plot the course of the captured rockets as they are sent streaming into the sky during the tests. From these experiments, the Army hopes to develop methods of defense against jet-propelled attacks.

If radar devices can successfully chart the course of the 3,000 miles-per-hour missiles, the Army's experts say that it should be possible to explode enemy rockets in mid-air by a radar-controlled "counter-attack" rocket With radar charting the course of a missile as it heads toward the country, they say that it may be possible to send rockets into the arc of flight of the enemy weapon to explode it high in the air

The tests this summer will be conducted on a course 150 miles long and 50 miles wide with the Ordnance, Air Forces and Signal Corps of the Army cooperating in the experiments. Officers and civilians from Air Technical Service Command laboratories and veterans from the European occupational air force will man radar devices for the AAF, while Army Ordnance experts fire the Nazi rockets.

"A means must be found to defend our country against a sudden enemy rocket attack," Brig. Gen William L. Richardson, chief of the guided missiles division of the Air Staff, said

"We want to develop a method whereby we can intercept enemy rockets in mid-air We cannot hope to do this, however, until we discover a method of tracing their course through the sky and predetermining their arc of flight.

"Once we accomplish this," declares Gen Richardson, "it will be possible to design a 'counter-attack' rocket which will be controlled by radar and will be capable of intercepting the enemy rocket at a predetermined point in its course"

Gen Richardson said that the AAF has been working on a defense against rockets since the first German V-2 landed accidentally in Sweden in the autumn of 1943, and he pointed out that offensive as well as defensive developments are expected from the tests with the Nazi missiles

Science News Letter, March 30, 1946

ENGINEERING

Index to Nazi Struggle

Germany's locomotives are indicative of her struggle during the war to save materials, cost and labor. 1,000 parts eliminated, 30 tons in weight saved.

➤ GERMAN WARTIME locomotives exhibited by the Army Transportation Corps Board are an index to Germany's struggle during the war to meet transportation needs and at the same time save cost, critical material and labor In one, built in 1942, drop forgings were used, materially reducing its cost. In this model the designers eliminated a thousand component parts from the German Series "50" locomotives which it replaced.

Builders of this so-called standard-type class "52" locomotive, for freight service, saved approximately 30 tons of materials required in the "50" locomotive, and eliminated 6,000 manhours of labor In addition to the parts eliminated, 3,000 other parts were modified or altered in its design over the series "50" locomotive

Another locomotive, built in 1944, embraces all savings in manhours and materials known in the production of the series "52" locomotive and in addition corrects the faults of that engine It appears to have the best thermal efficiency of the German war-built locomotives.

A third, built in August, 1944, is a type 2-10-0 steam engine with a condenser arrangement embodied in the tender. Several claims were made for its performance, one of 12,000 miles without water replenishment The better figure, and that supported by greater authority, is 700 miles, according to Army officers.

A diesel switch engine with interesting features was also exhibited, as well as an eight-cylinder axle-drive steam locomotive, built in 1941 and designed for high-speed passenger service. Interesting also is a narrow-gauge steam locomotive built for the German Army for use on the Eastern front where much of the track gauge is 29⅝ inches or 750 millimeters

The exhibit displayed at the Norfolk Army Base included also many items of captured German marine and other equipment including diesel engines for submarines, minesweepers, naval vessels, dirigibles and vehicles. The development of the diesel for dirigibles was instituted at the request of the Zeppelin Works, and its weight and size were kept within the limits of the corresponding gasoline engines It is a V-type supercharged four-stroke cycle marine diesel, with individual cylinders of welded steel, and a crankcase of aluminum alloy It was used on German "E" boats

Science News Letter, March 30, 1946

ENGINEERING

Captive "Torpedo" Hunts Acoustic Mines

➤ A WARTIME invention still useful in clearing away some of the deadly remainders of war is covered by patent 2,395,862, issued to two government-employed civilians, H B Freeman and B A Wiener, both of Washington, D C It is a device for finding and exploding acoustic mines, many of which are still lurking in the world's seaways.

The device consists of a torpedo-shaped body, to be towed under water by a mine-sweeper. A propeller at the stern rotates a shaft within, on which are mounted a pair of flexible arms with metal balls on their ends These strike rapidly against projections from the inner wall, producing a drumming or humming sound that is a good enough imitation of a ship's noise to set off acoustic mines.

The inventors have assigned their patent rights, royalty-free to the government.

Science News Letter, March 30, 1946

PUBLIC HEALTH

Syphilis Is Long Fight

The idea of wiping out this disease in one generation is called a "pipe dream", even with penicillin. Control of gonorrhea is more hopeful.

➤ "PENICILLIN has proved a tremendous boon to both patients and physicians in the treatment of all stages of syphilis," Dr Evan W. Thomas, of New York University College of Medicine, declared at the meeting of the New York Tuberculosis and Health Association

He warned, however, that in spite of penicillin or any new treatment that may be discovered, syphilis is not likely to be controlled through treatment alone

"It is becoming more evident every day," he declared, "that the dream of eradicating syphilis in a generation is a pipe dream and little more than a pious hope, if we are dependent entirely upon effective methods of therapy alone

"No disease yet has been controlled entirely by treatment," he pointed out, "and syphilis is far more complex and difficult to eradicate than most infectious diseases

"Both the psychological and social factors which favor promiscuity and poor sexual hygiene require further investigation if we are to get at the roots of the spread of syphilis"

He urged fighting promiscuity with education and reasoned arguments and also urged giving the lay public continuous access to the best existing knowledge about syphilis

A more hopeful view on control of another venereal disease, gonorrhea, was taken by Dr Alfred Cohn, chief of the division of venereal disease research of the New York City Department of Health Citing a cure rate of 98% with one type of penicillin treatment, and comparing various methods of using penicillin to treat gonorrhea, Dr Cohn said

"From the aforementioned data we may conclude that penicillin is an effective weapon for the control of gonococcal infections which when adequately and wisely used will help us to eradicate one of the great scourges of human-kind"

Penicillin does not have any beneficial effects in another venereal disease, lymphogranuloma venereum, sometimes known as tropical bubo, nor in granuloma inguinale, Dr. Borris A Kornblith, of Gouverneur Hospital in New York, stated

Current methods of treating the first of these diseases include sulfa drugs, Frei's antigen and in some cases surgery For granuloma inguinale, which is increasing in the southern United States, especially in the coastal areas, antimony drugs are used, sometimes with surgery About one-fifth of the cases are not cleared up by antimony treatment and the sores remain open and infectious, which creates a serious public health problem.

Science News Letter, March 30, 1946

OCEANOGRAPHY

Seaweed Products Important in Industry

➤ SEAWEED gathering and processing is becoming an important American industry It was stimulated during the war by shortages of seaweed products formerly obtained from Japan and other countries. The most-felt shortage was for one seaweed product, agar, used extensively by scientists in preparing solid bacteriological culture media, also in bakery products, medicines, health foods, and dental impression materials

How World War II stimulated interest among some of the United Nations in developing greater seaweed resources was reviewed recently by Dr C K Tseng of the Scripps Institution of Oceanography. In 1940, he said, the United States had a single agar factory which produced 24,000 pounds annually, now there are four with a combined output of 200,000 pounds each year

Another important derivative from seaweed, he said, is algin, which is used as an ice cream stabilizer Dairy experts regard it as equal to gelatin for this purpose Four American companies are making algin, and from 2,000,000 to 3,000 000 pounds of alginous products are produced annually

A third important seaweed product, he continued, is carrageen, or Irish moss extract, now the standard suspending agent for cocoa particles in chocolate-milk preparations Three companies are producing some 500,000 pounds of the extract annually, and others are processing carrageen

Science News Letter, March 30, 1946



***ANTIQUE CHARM BRACELETS**—Ancient Persians around 1300 B. C. used bangle bracelets and necklaces, according to Richard A. Martin, curator of Near Eastern Archaeology of the Chicago Natural History Museum. Most of the charms are miniature horses, dogs, frogs, goats, animal heads, pots and human hands and feet—as odd and unrelated an assortment as young girls wear today. The picture of "costume jewelry" recently acquired by the museum shows some of the objects worn in ancient Persia as compared with a bangle bracelet (center) popular today.*

MEDICINE

Fatality in Appendicitis Greatly Decreased

➤ THE NUMBER of people dying from appendicitis in the United States dropped about two-fifths within the short space of three years Between 1940 and 1943, the latest year for which data are available, the number of deaths due to this disease decreased from 99 to 61 per 100,000, a Metropolitan Life Insurance Company report shows

A little more than a decade ago, 18,000 died each year from appendicitis By 1943, however, the number of deaths in a much larger population had been cut to 8,100 The magnitude of this feat is realized when we consider that if the appendicitis death rate of the early 1930's prevailed today, the disease would now take about 20,000 lives a year

The greatest improvement was experienced in Rhode Island and Maine, each of which shows a reduction of 62% in the three-year period Although other states in the Mountain and Pacific region showed a larger relative decline than did the country as a whole, Nevada recorded a drop of only 19% The smallest gains in reducing the mortality from appendicitis was made by the southern states, but even in this area no state recorded a reduction of less than 27% between 1940 and 1943

The use of chemotherapy in cases complicated by peritonitis is undoubtedly responsible in large measure for this change, the report states Part of the credit also belongs to the national educational campaign which effectively warned the public against delay in seeking medical advice and against the use of laxatives in case of abdominal pain, they state

Science News Letter, March 30, 1946

PHYSICS

Baruch Will Fight for Atomic Energy Use

➤ WHEN Bernard M Baruch, a grand old troubleshooter of two generations and two wars, takes his place as the American member of the UNO commission on atomic energy he will be fighting for the peaceful use of one of the most powerful sources of radiation, as well as the peaceful use of science's most powerful discovery, atomic energy

A part of his personal fortune has been presented by Mr Baruch to the American people as a foundation for physical medicine, meaning the application of powerful radiations, as well as sunshine, heat, baths, etc, to the curing of human ills

So as the man, known for his sitting in the sunshine on a Washington park bench, struggles as our representative in controlling atomic energy for the world, he will be motivated by a deep-seated desire to help humanity by controlling for good the radiation that is more powerful than anything this side of the stars, even more powerful than radium

The equivalent of tons of radium has been going unused and wasted during plutonium manufacture while the military have kept the atomic energy results under a cloak of secrecy An array of new atomic bomb by-products, if used in research, may allow our medical men to understand more closely the nature of cancer, heart disease and a host of other human ills

His main job will be aiding the control of human emotions and actions so that atomic energy will not be loosed upon the world with destructive intent And as he fights this battle for peace, he and his medical advisers will undoubtedly be doing what they can to extract from the clutches of secrecy the new tools of medicine that have come out of the atom. *Science News Letter, March 30, 1946*

PSYCHOLOGY

Work for Older People Is Vitally Necessary

➤ JOBS SUITED to their abilities rather than public financial help is the answer to the problems of older people, believes Dr George Lawton, director of the Old Age Counselling Center in New York

Declaring "America cannot demobilize old age," Dr Lawton discussed the problems of aging as a guest of Watson Davis, director of Science Service, on "Adventures in Science," heard over the network of the Columbia Broadcasting System

Even with greater old age assistance and social security benefits, the New York psychologist reported, "the normal older person given the choice between a congenial job and an income, whether as a federal grant or on a retirement pension, would prefer to keep on working as long as physically able"

"While there is no systematic research to prove that people who work longer live longer," Dr Lawton said, "psychological and medical men on the basis of their clinical observation believe that of two men equal in all other respects, the one who keeps on working at a job he likes and can handle, will live longer than the one that retires"

Science News Letter, March 30, 1946

IN SCIENCE

DENTISTRY

Prevention of Tooth Decay May Come from Penicillin

➤ WILL PENICILLIN prevent tooth decay if you scrub your teeth with it?

An answer to that question will be sought this summer in a wholesale test with human guinea pigs, by Dr Thomas J Hill of Western Reserve University The test will be made on 1,000 boys in an Eastern industrial school, beginning about July 1 and continuing for a year or more Half of the boys will use tooth powder with penicillin added, the others will use a penicillin-less powder At the end of the period the comparative numbers of cavities in the two groups should provide a definite yes-or-no answer

Dr. Hill was stimulated to undertake this large-scale test by apparently significant results with smaller groups Mouths in which the penicillin powder was used daily for several months were found to be practically free from the normally swarming populations of bacteria, including an acid-favoring species or group held to be a contributing factor in tooth decay.

Science News Letter, March 30, 1946

MEDICINE

BAL Drug Successful For Treating Poisoning

➤ THE DRUG, BAL (British antilewisite) will soon be released by the Food and Drug Administration for general distribution, Maj Alfred Gilman of the Chemial Warfare Service has revealed This chemical warfare material has been saving the lives of patients in Baltimore who took bichloride of mercury either by accident or with suicidal intent

The police in Baltimore have by special arrangement been sending all such cases to the Johns Hopkins Hospital where Dr Warfield T Longcope and Dr John A Luetscher have treated 26 patients with good results

Some recovered so rapidly under treatment with this amazing chemical that they walked out of the hospital within three or four days after taking a fatal dose of bichloride

Science News Letter, March 30, 1946

E FIELDS

GENERAL SCIENCE

Four Science Service Writers Receive Awards

➤ FOUR SCIENCE Service editors are included in the 13 pioneer science writers who received at St Louis the first presentations of the George Westinghouse Science Writing Awards of the American Association for the Advancement of Science

The writers for Science Service being thus honored are Watson Davis, Frank Thone, Jane Stafford and Marjorie Van de Water

Watson Davis is director of Science Service and inaugurated its newspaper service in 1921, Dr Frank Thone is editor in biology and has been on the staff since 1924 Miss Jane Stafford has been medical editor since 1928 and Miss Marjorie Van de Water, psychology editor, has been on the staff since 1929

Science Service has ten science editors, the largest science news staff of any press association

Other science writers to receive the award are Howard W Blakeslee, Associated Press, David Dietz, Scripps-Howard Newspapers, Thomas R Henry, *Washington Star;* Waldemar Kaempffert, *New York Times,* Gobind Behari Lal, *American Weekly,* William L. Laurence, *New York Times,* Herbert B Nichols, *Christian Science Monitor,* John J O'Neill, *New York Herald Tribune,* Robert D Potter, *American Weekly*

Science News Letter, March 30, 1946

METEOROLOGY

Structure of Meteorites May Be Clue to Their Past

➤ INTERNAL structure of iron meteorites may give clues to the past life of these visitors from space that crash into the earth's atmosphere, state E P Henderson and S. H Perry of the U S National Museum

Although many more stone than iron meteorites have been seen to fall as shooting stars, more irons are on exhibit in museums because they are the more easily identified Iron meteorites are composed chiefly of iron and nickel, with small amounts of cobalt, phosphorus, sulfur and other elements

After intensively studying an iron meteorite found a few years ago in Ohio, Mr Henderson and Mr Perry believe that when iron meteorites of almost identical composition differ in structure, it is a sign that the conditions through which they have passed are quite different Heat, together with the length of time the mass remains at a high temperature, is probably responsible for this

The iron-nickel alloy known as taenite occurs in most iron meteorites It is rarely possible to separate pure taenite in sufficient quantities to analyze it, but the structure of the New Westville iron permitted the mechanical separation of enough for analysis Taenite varies in chemical composition, and it is believed that the higher the percentage of nickel contained, the lower the temperature at which the taenite was formed The taenite in the New Westville iron contained 26 13% nickel

Working out the complete history of a meteorite from the study of its internal patterns is not simple The two scientists plan to continue their present investigations until many meteorites have been analyzed and metallographically studied, then heat-treat these specimens under controlled conditions to determine what significant changes take place Eventually they hope that the internal structure may be understood sufficiently to give a brief autobiography of each meteorite

Science News Letter, March 30, 1946

AERONAUTICS

Wartime Aircraft Secrets May Be Discussed

➤ WARTIME SECRETS in aircraft engineering are expected to be discussed at the National Aeronautic meeting of the Society of Automotive Engineers to be held April 3 to 5 in New York Aeronautical engineers will have their first opportunity since the war for unrestricted technical review of wartime developments in commercial, military and private flying

An opportunity will be given the engineers, also, to inspect certain German achievements in aviation with equipment on display loaned by the U S Army and Navy They may see, in addition, the operation of Fido, the fog dispersal operation which enabled Allied warplanes to operate from British bases in Europe's thickest weather American aircraft powerplants will be on display, particularly the General Electric I-40 jet propulsion engine The engineers will inspect airline maintenance engineering and operation at LaGuardia Field and make airline flights over other airports.

Science News Letter, March 30, 1946

METALLURGY

Circular Home of Light Metal Under Production

➤ A CIRCULAR home of aluminum, with side walls and partitions suspended from a concealed central steel mast, has been displayed in model form It is a Fuller house, developed from the original "Dymaxion" design by R Buckminster Fuller in 1929 Its construction and use are now claimed to be practical because of the developments in light metals during the war and the use of techniques in mass-production that came with the construction of giant airplanes It will be produced by the Beech Aircraft Corporation of Wichita, Kans

This new Dymaxion is constructed of aluminum, stainless steel, and plastic It has 1017 square feet of floor space and includes a combined living and dining room, two bedrooms, completely equipped kitchen, two complete bathrooms, and an entrance hall A heating and air-conditioning equipment comes with the house The price, erected and ready for use, is $6,500

This $6,500 price includes the kitchen equipment in which is a cooking range, refrigerator, dishwasher, sink, washing machine and drier, and a waste disposal unit With its ventilating system the inside air can be changed in six minutes The exterior requires no painting The building can withstand 180-mile hurricanes

The house weighs only four tons, one-tenth the weight of conventional frame houses In the condition in which it is shipped from the factory, it can be erected on its foundation, after it reaches its site, in two days by an eight-man crew

Science News Letter, March 30, 1946

ENGINEERING

Lamme Medal Awarded David C. Prince

➤ THE 1945 LAMME medal of the American Institute of Electrical Engineers will be presented at the summer session of the Institute in Detroit, June 24, to David C Prince of the General Electric Company, it is announced at the headquarters of the Institute

The award to Mr Prince is made for his distinguished work in the development of high-voltage switching equipment and electronic converters The medal is an annual award established through a bequest of Benjamin Garver Lamme, who for 21 years before his death in 1924 was chief engineer of the Westinghouse Electric Corporation.

Science News Letter, March 30, 1946

ASTRONOMY

Four Planets Now Visible

Venus, Saturn, Mars and Jupiter appear in April evening skies. Easter is on April 21, the latest that it comes between 1943 and 1957.

By JAMES STOKLEY

➤ AFTER making its debut in the 1946 evening sky in March, Venus has now drawn still farther from the sun It sets later, so at the time of sunset it is now about 15 degrees above the horizon This is roughly the span of the hand when held at arm's length Thus Venus, which is of magnitude minus 3 3, more brilliant than any other star or planet, is easily seen in the early evening. However, it sets before the times for which the accompanying maps are prepared—namely, for 10 00 p m. at the first of April and 9 00 p m in the middle of the month

On the maps, however, there are shown three of the five planets that ever can be seen with the naked eye Of these the most brilliant is Jupiter, in the constellation of Virgo, the virgin, toward the southeast. The planet is close to the star Spica, which is classed as first magnitude, 1 2 on the astronomical scale of brightness Jupiter's magnitude is minus 2, which means that it is about 19 times as bright

The other two, Mars and Saturn, are in the constellation of Gemini, the twins, where they have been performing an interesting dance in recent months, practically forming a new constellation with the bright stars of that group, Castor and Pollux Saturn, magnitude 0 3, is a little below Pollux, brighter of the twins Mars is to the left, red in color, and about the middle of April is in line with Castor and Pollux, making the twins temporarily triplets

Brightest Star

Sirius, the dog-star, in the constellation of Canis Major, the greater dog, is the brightest star now seen, and it stands low in the southwest. Above it is Procyon in Canis Minor, the lesser dog. Leo, the lion, is high in the south, and part of this constellation, toward the west, is called the "sickle," with bright Regulus at the end of the handle.

High in the north is Ursa Major, the great bear, with the great dipper, upside down. In this figure are the two stars called the pointers, which indicate the pole star below. The handle of the big dipper points to the east, and if its curve is continued, it leads to first magnitude Arcturus, in Bootes, the bear driver

In the northwest, below Castor, is Auriga, the charioteer, with Capella Below Auriga is Taurus, the bull, with ruddy Aldebaran near the horizon Though it was one of the brilliant orbs of the winter evening sky, it is now so low that it has lost much of its glory

Lacking clocks and calendars, early man had to use recurring natural effects to mark time The alternation of day and night provided the most obvious and fundamental unit—the day—while the parade of the seasons, with the sun high in the noonday sky at one period, and low in another, gave a longer measure—the year But there was a need for an intermediate unit, and this was given by something that goes on in the nighttime sky, namely, the changing phases of the moon, which first appears in the west just after sunset as a narrow crescent, then gets bigger and bigger, night after night, until full moon is reached, and then wanes until it is last seen as a crescent in the east just before sunrise A couple of days later the evening crescent reappears, and the cycle begins again

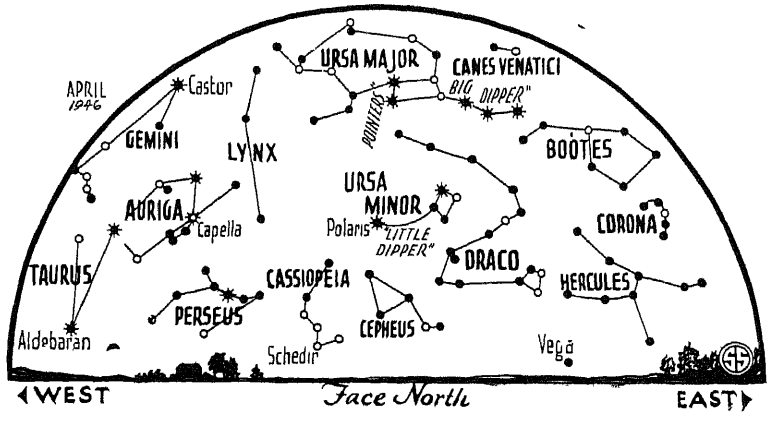
This marked the month, the name of which is derived from the moon, while the name of that body goes back to the ancient Sanskrit in which the moon was called "mas " That was derived from the Sanskrit verb "mati," meaning "it measures," indicating how early it was used for an indicator of time

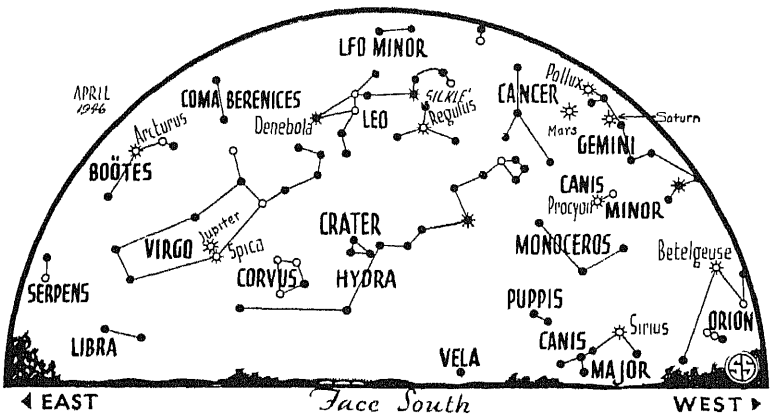
In many early calendars the month began with the first appearance of the crescent moon in the western sky This was true of the Hebrew calendar, and it was the duty of the priests to watch and announce it to their people by blowing a horn Since the time between return of the same phase of the moon is 29½ days, they alternated the lengths of their months between 29 and 30 days

The first month in the old ecclesiastical calendar of the Jews is the month of Nisan, which starts with the new moon occurring about the time of the vernal equinox, the beginning of spring The 14th of Nisan is the beginning of the holy season of the Passover, commemorating the sparing of the Hebrews in Egypt when God, smiting the first born of the Egyptians, passed over the houses of the Jews, which were marked with the blood of the lamb

Passover and Easter

It was about this time, in the Jewish calendar, that Christ was crucified, and the Last Supper, which he ate with the disciples the day before the Crucifixion, was the Passover feast. Consequently, the Jewish Passover and the Christian celebration of Easter are closely connected The rule for the determination of the latter was set in 325 A D by the Council of Nicaea Passover, of course, comes at the full moon since it is 14 days after the start of the month of Nisan, and it may come on any day of the week. The Council, however, decided that Easter should always come on a Sunday, the one following the Paschal (or Passover) full moon, which in turn was the first full moon after the vernal equinox But they wanted to keep Easter and Passover forever separate, so they decided that when the full moon, and Passover itself, came on a Sunday, the following Sunday should be Easter





Now let us see how this works out this year The vernal equinox came on March 21, only four days after a full moon That puts off the Paschal full moon to April 16, when Passover begins, but that is a Tuesday, so Easter does not come until Sunday, April 21 This is an unusually late Easter, the latest between 1943 and 1957 Only 10 times in the twentieth century does it come as late. However, Easter can come, as it did in 1943, as late as April 25 To do this, there must be a full moon on the 20th, the day before the equinox, and that day must be a Saturday This postpones the Paschal full moon until Sunday, April 18, making the following Sunday, April 25, that of Easter.

The earliest that Easter can come is March 22 This happens when the full moon comes on the 21st and that day is Saturday It occurred last in 1818, and will not be repeated at all in the twentieth century. In 1845, 1856 and 1913 Easter came on March 23, but it will not occur again as early as that in this century Easter in 1940 was March 24, but even that will not be repeated before the twenty-first century. In 1951, however, it will come on March 25

Thus, there is a variation in the date of Easter of 35 days Many other activities in the church, as well as in secular life, depend on it and vary as well For this reason there has been a movement for fixing Easter There seems to be no religious objection to doing this. As a matter of fact, Christmas once varied in a similar manner, and was fixed in the fourth century

The second Sunday in April has been suggested as the best date for Easter. It is close to April 9, accepted as the date of the Resurrection (in the year 30 A D) In 1928 the British Parliament passed a law fixing Easter on the first Sunday after the second Saturday in April, to take effect when other nations agreed to do the same The League of Nations had a committee studying the problem Perhaps, when they have settled matters of more immediate importance, the UNO will get around to this, and then Easter may stop its centuries of wandering

Celestial Time Table for April

April	EST	
1	11.37 p m	New moon
2	11 01 p m	Moon passes Venus
3	5 00 p m	Moon nearest, distance 224,600 miles
8	2 26 p m	Moon passes Saturn
	3 04 p m	Moon in first quarter
9	1 39 a m	Moon passes Mars
12	7 00 p m	Jupiter opposite sun and nearest earth, distance 413,500,000 miles
15	8 05 p m	Moon passes Jupiter
16	5 47 a m	Full moon
19	8 00 a m	Moon farthest, distance 252,100 miles
21	early a m	Meteors of Lyrid shower visible
23	4 00 a m	Mercury farthest west of sun, in morning sky before sunrise
24	10 18 a m	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three for PST

Science News Letter, March 30, 1946

NUTRITION

Quick Cooking Saves Vitamin Content

➤ QUICK COOKING methods not only save time for the cook but also save vitamins for her and her family's health

Consider potatoes, for example. Nutritionists have long advised cooking them in their jackets, to save vitamins. Now scientists of the U S Bureau of Human Nutrition and Home Economics say that boiling potatoes in their skins is a better method even than baking them, so far as retaining vitamins is concerned.

Their pronouncement is based on tests with common foods cooked by home methods Potatoes baked in their skins, these tests showed, lost as much as 80% of their original vitamin C and 50% of their thiamin or vitamin B_1 When potatoes were boiled in their skins, however, the vitamin C loss was only 40% and the loss of thiamin 15% to 20% In other words, baked potatoes lose twice as much vitamin C and three times as much thiamin as potatoes boiled in their skins

Oatmeal is another food the government scientists tested to see how cooking would affect its vitamin content This food is a good source of thiamin and the tests showed that when cooked directly over the flame for two and one-half minutes the thiamin loss is small When the oatmeal is cooked for 30 minutes in a double boiler, however, the thiamin loss is 30%, or 15 times as great

The vitamin A value of yellow cornmeal cooked by these two methods, on the other hand, appears to be the same, the tests showed This vitamin is present in plants or plant foods in the form of carotene, a chemical which the body converts into the vitamin Carotene is, in general, relatively stable during cooking

Science News Letter, March 30, 1946

ENTOMOLOGY

British Insecticide Controls Boll Weevil

➤ THE COTTON boll weevil, probably the most damaging pest to the American cotton crop, may completely succumb to a new British insecticide, benzene hexachloride, which American field tests indicate is more effective, as far as cotton insects are concerned, than DDT or the old stand-by, calcium arsenate The new material killed also more cotton leafworms, plant bugs, cotton fleahoppers, and cotton aphids than the standard insecticides

Benzene hexachloride, as a cotton insecticide, apparently has one weakness, scientists of the U S Department of Agriculture who made the tests state It is not as effective as calcium arsenate or DDT for the control of bollworms However, it has no ill effects on cotton plants when used in low dosages

The new material will not be available during the coming cotton season for general application, but is now being made in the United States in sufficient quantities to continue experimentation. If tests to be made this summer are as satisfactory as expected, and serious shortcomings do not come to light, it will probably become available to cotton growers within a relatively short time

Science News Letter, March 30, 1946

Do You Know?

With a standard *parachute* a man falls at about 14 miles an hour.

Big-game animals have increased in the United States during the recent years to over 7,000,000, or one to every 19 human beings in the nation

Fish kept in cold storage for a long time unprotected from atmospheric oxygen deteriorates; the fat becomes rancid, darkening the flesh to a rust color.

Color blindness of the mild red-green type has been apparently cured by a course of treatment that includes vitamin A

Mixing *penicillin* with ice cream makes possible its administration by mouth instead of through the usual hypodermic injection

The contents of the Army insect-killing device known as the *aerosol bomb* included 3% DDT, 2% of a 20% pyrethrum concentrate, 5% cyclohexanone, 5% lubricating oil, and 85% Freon gas as carrier

Asparagus loses quality rapidly after harvesting as ordinarily handled, experiments are now being conducted to prevent deterioration by wrapping selected bunches in cellophane bags, icing immediately and keeping refrigerated

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ASTRONOMY

Universe Not So Old

Is now believed to be only slightly older than the earth. Studies of the Milky Way are the most direct evidence of new theory.

➤ THE UNIVERSE as a whole is now believed to be only slightly older than our own earth, Dr Bart J Bok of the Harvard Observatory told the nation's outstanding high-school-age scientists at a session of the Science Talent Institute

Dr Bok discussed modern advances in the study of astronomy at the Science Institute attended by the 40 winners of the Fifth Annual Science Talent Search, sponsored by Science Clubs of America and administered by Science Service.

Pointing out that astronomers of 25 years ago estimated the age of the universe at five trillion years, as opposed to a mere two or three billion years for the earth, the Harvard astronomer said that modern research has cut the estimated age of the universe to only slightly more than that of the earth

Dr Bok attributed the recent reduction in estimates of the age of the universe to photographic studies of the Milky Way, spectrum studies of the heaven's galaxies and developments in astronomic theory

The most direct evidence that the universe is not much older than the earth is to be found in the studies of the Milky Way, said the astronomer

Our Milky Way system is composed of many loosely-held-together clusters of stars, he explained As the Milky Way is rotating rapidly about its central star clouds, the shearing effects resulting from the tidal pull of these central clouds would tend to disrupt loose aggregations of stars in a matter of a few galactic revolutions, he pointed out

"We know of no way in which star clusters are still being formed at the present time," he said, adding that "The presence of several hundred clusters on our Milky Way photographs indicates, therefore, that our system has not been whirling around its axis for more than a relatively few galactic revolutions."

Time estimates, Dr Bok continued, can be made from studying the spectrum lines of the more distant galaxies to determine how long ago all galaxies were together at the origin of the expansion. These studies place the age of the universe at from two to three billion years, he said

The discovery of stars pouring out tremendous amounts of energy that indicate a more recent age has led to changes in the theory of astronomy that support the shorter time-scale for the universe, the astronomer said

"Everywhere in the universe there are signs of youthful exuberance," declared Dr Bok

Science News Letter, March 30, 1946

ELECTRONICS

Velocity and Accuracy Tests Made Simultaneously

➤ HOW AN ELECTRICAL method developed by the War Department during the war to measure the velocity of projectiles is now in use by the Western Cartridge Company in East Alton, Ill, to make simultaneous accuracy and velocity tests with the same bullet is told in *Sports Afield* Previously, separate bullets were required for each test

The instrument used is called a counter chronograph In making the dual velocity and accuracy tests, a rifle is fired from a mechanical rest The bullet passes over photoelectric cells in two devices called light screens which are a measured distance apart, and are connected with the counter electrically The shadow cast by the bullet as it passes over the first photocell starts the chronograph counting, its shadow over the second cell stops the counting When used outdoors only daylight is required, within darkened shooting ranges tubular lights, under which the bullet passes, are used The counter records the time required for the bullet to pass from one screen to the other A target beyond records the bullet's accuracy

The "brain" of the counter chronograph is a so-called electronic counting circuit which performs the breath-taking function of counting and recording 1/100,000-second time intervals. With an ingenious arrangement of tiny neon bulbs it records the count of electronic pulses that pour into the counter at a rate of 100,000 per second. With its four banks of light, it can count 9,999 pulses, the time measurement of about one-tenth of a second.

Science News Letter, March 30, 1946

ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone



Domesticated Flies

➤ FOR CENTURIES, the honeybee was the only insect that could be counted among man's domestic animals To be sure, the bee was somewhat less domestic even than the goat it would consent to live in quarters provided by man, and would yield up part of its product to him under rather drastic persuasion But the fly remained wholly wild and free, living in man's houses as a tolerated pest, as rats and mice do

Only when the fly finally became recognized as a disease-carrying pest that could no longer be tolerated did man take the trouble to domesticate it Nowadays, in a considerable number of places, flies are solicitously reared on selected food in large, sanitary cages Special care is given to insure maximum reproduction and growth to healthy maturity of the insects that emerge after pupation

This procedure, which a couple of generations ago would have been regarded as sheer lunacy, is carried out in order to secure adequate stocks of flies on which to test the potency of insecticide sprays When a new batch of spray is ready, a counted number of flies are released into a windowed test chamber. The spray is released under uniform pressure through standardized nozzles

By tens and fifties the victims fall, while the entomologists coolly watch the slaughter through the window. After a stated time period they count the survivors If these number more than a certain maximum percent, the batch of spray is rejected as too weak If the "knockdown" number is high enough, and the eventual kill is also high, the spray receives the official OK

This business of wholesale production of flies for the insecticide testing laboratories has been going on not quite a quarter-century When the first domestic fly sprays were produced, back in the early '20's, the winged guinea pigs, needed to assay their deadliness, had to be captured in the wild—usually in the rear of livery stables that still survived at that time.

Soon, however, this haphazard source proved insufficient It was inadequate qualitatively as well as quantitatively, for comparative tests showed that "wild" flies from the dungheap were not as strong and tough as those hand-raised on more carefully selected foods, and hence not as good test animals Oddly enough, it was found that the best fly food is milk Milk-fed flies are quite the opposite of tender, in Flydom, "milksop" means "toughie."

Science News Letter, March 30, 1946

CHEMISTRY

Vacuum Drying Produces Superior Foods

➤ VACUUM-DRYING of frozen fruits and vegetables may solve the problem of food preservation by the dehydration method and give products superior to those resulting from the ordinary hot-air dehydration used extensively during the war, which, it is claimed, do not retain satisfactorily full flavor, appearance and nutritive value The "freeze-drying" process, still in an experimental stage, is similar to the successful method of preparing blood plasma, penicillin, vaccines and bacteriological cultures for preservation and shipment

In this freeze-drying method the material to be dried is first frozen and then exposed to a high vacuum Because the ice in the frozen material vaporizes without melting, the process is sometimes spoken of as drying by sublimation It is not a new method. As far back as 1909, L F. Shackell of the University of Missouri experimented with the preservation of perishable sera by drying under a vacuum Its use in dehydrating fruits and vegetables, however, is new.

A preliminary report on the freeze-drying method of the dehydration of fruits and vegetables has been made by James C. Moyer and Elmer Stotz of the New York State Agricultural Experiment Station. They are careful to state that the procedure is still in an experimental stage

"In the comparison of vegetables or fruits dried by sublimation and those dehydrated in the usual manner in a stream of warm air," they state, "the light, porous nature of the vacuum-dried material provides a contrast to the shrunken and glassy or case-hardened outer surfaces of the heat-dried products The open, porous texture of the vacuum-dried fruits or vegetables is responsible for their extremely rapid reconstitution when placed in only cold water"

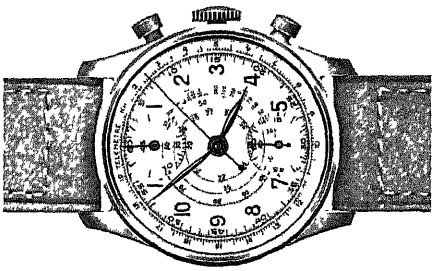
Reconstituted vegetables, dehydrated by the freeze-drying process, are not tough, and have lost little flavor The loss of ascorbic acid, or vitamin C, is only 2% to 10%, while in the warm-air process it is from 20% to 30% Much research remains to be done, the two experimenters say, before fruits or vegetables can be readily preserved by this sublimation method, but the process will some day be commercially possible

Science News Letter, March 30, 1946

Sumac is a valuable shrub to protect soil from erosion because it grows in rough places with poor soil, at the same time it can be a valuable cash crop because it yields a tanning material needed in leather-making

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ARCHITECTURAL DRAWING AND DETAILING —J. Ralph Dalzell and James McKinney—*American Technical Soc,* 212 p, diagrs and tables, $2 50, rev ed. The general principles and techniques of architectural drawing, detailing, rendering in pen and ink, and landscaping

THE AVIATION ANNUAL OF 1946—Reginald M Cleveland and Frederick P Graham, editors—*Doubleday,* 245 p, illus, $4 A consideration of the present situation in aviation and a survey of the possibilities for travel, commerce and protection for peace in the air of tomorrow Articles by General H H Arnold, Fleet Admiral Ernest J King, Dr George W. Lewis, and many others

BRACHIOPODA OF THE INDEPENDENCE SHALE OF IOWA—Merrill A Stainbrook —*Geological Soc of America,* 74 p, illus, $1 Geological Society of America, Memoir 14

COLD STORAGE FOR APPLES AND PEARS—W V Hukill and Edwin Smith—*Dept of Agric,* 61 p, illus and tables, 15 cents The response of fruit to storage conditions, cold storage plants and equipment, and tables of the average freezing temperatures of fruits and other relevant data

DR MORTON Pioneer in the Use of Ether—Rachel Baker—*Julian Messner,* 224 p, illus, $2 50 The biography of a man who took as his mission the alleviation of pain

DOCTORS, DRUGS AND STEEL—Edward Podolsky, M D —*Ackerman,* 384 p, illus, $3 75 The story of penicillin, the sulfa drugs, hormones, and other recent medical discoveries destined to lengthen man's life span

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THE JOURNAL OF FREQUENCY MODULATION —Harold Becker, Managing Editor—*Telecasting Publications, Inc,* Monthly, $3 a year First issue of a new Journal

ONE WORLD OR NONE—Dexter Masters and Katharine Way, editors—*McGraw,* 79 p, diagrs, $1 Reports to the public on the full meaning of the atomic bomb by Albert Einstein, Irving Langmuir, Harlow Shapley, Walter Lippmann, and others

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PAINT MANUAL With Particular Reference to Federal Specifications—Percy H Walker and Eugene F Hickson—*Dept. of Commerce,* 165 p, illus and tables, $1 An aid in procuring materials suitable and adequate for most kinds of painting Methods are described for preparation of surfaces and the application of coatings

PHYSICAL CONSTANTS OF HYDROCARBONS: Vol 3, Mononuclear Aromatic Hydrocarbons—Gustav Egloff—*Reinhold,* 661 p, diagrs and tables, $15 American Chemical Society Monograph Series

PSYCHOANALYTIC THERAPY Principles and Application—Franz Alexander, M D, and Thomas M French, M D, with Staff Members of the Institute of Psychoanalysis, Chicago—*Ronald Press,* 353 p, $5 The results of an investigative work which represents a concerted effort to define those basic principles which make possible a more efficient means of psychotherapy and to develop specific techniques of treatment

PSYCHOLOGY FOR NURSES Designed and Written for Student Nurses—Bess V Cunningham—*D Appleton-Century,* 336 p, diagrs and tables, $3 An introduction to psychological principles which will help the nurse during the critical period of orientation and training as well as in her later professional contacts with associates and patients

RUBBER IN ENGINEERING Prepared under the direction of the Controller of Chemical Research of the Ministry of Supply and the Directors of Scientific Research of the Ministry of Aircraft Production and the Admiralty on the Basis of Research Carried out by the Imperial Chemical Industries, Ltd —*Chemical Pub,* 267 p., illus. and tables, $5 50 A general survey of the information available on the fundamental properties of rubber

SIMPLIFIED ARCHITECTURAL DRAWING With Examples and Graded Problems—Truman C Buss, Jr —*American Technical Soc,* 258 p., diagrs and illus, $4 75 A book to fill the gap between instruction pertaining to mechanical drawing and that pertaining to architectural design.

SPANISH TRAVEL-AIDE—Victoria Villagomez Macaulay, arranged and edited by George F Cornwall—*Binfords & Mort,* 174 p, illus, $1 50, rev ed A quick approach to the Spanish language, ready-made expressions with phonetics and English equivalents

STEEL IN THE WAR—Douglas A Fisher—*U S Steel Corp,* 164 p, illus and tables, free The now-it-can-be-told story of an industrial accomplishment which contributed much to the victory of the United Nations in World War II

TEXTBOOK OF OBSTETRICS Designed for Use of Students and Practitioners—Henricus J Stander, M D —*D Appleton-Century,* 1277 p, illus and diagrs, $10, Stander's 3rd revision This edition represents the ninth edition of WILLIAMS OBSTETRICS, the first six of which were written by the late Dr J Whitridge Williams

WAR AND PEACE AIMS Extracts from Statements of United Nations Leaders—*United Nations Information Office,* 176 p, 75 cents. Special Supplement No. 7 to the United Nations Review

THE WHITEFISH FISHERY OF LAKES HURON AND MICHIGAN WITH SPECIAL REFERENCE TO THE DEEP-TRAP-NET FISHERY —John Van Oosten, Ralph Hile, and Frank Jobes—*Dept of the Interior,* 394 p., diagrs and tables, 35 cents Fishery Bulletin 40.

Science News Letter, March 30, 1946



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ASTRONOMY

International Astronomical Station Advocated

➤ CREATION of an international astronomical observatory and research station under UNO was advocated by astronomers of 13 nations, including Russia, Britain and the United States, meeting in Copenhagen for the first session of the International Astronomical Union's executive committee since the war

The astronomical station would be a strong and many-sided research organization if the proposal introduced by Dr. Harlow Shapley, director of Harvard College Observatory, is brought to fruition

Dr Shapley proposed that the United Nations Educational, Scientific and Cultural Organization should consider implementing development of truly international institutes in special fields, such as public health, new foods, astronomy and atomic energy He argued that scientists set the pattern for friendly active international cooperation.

We should do nothing nationally, he said, that it is possible to do as well or better internationally

The Polish delegation advocated both North and South Polar International Observatories.

The Soviet delegation reported plans for sending a group of leading Russian astronomers to America soon, preparatory to rebuilding Russian observatories destroyed by war Dr A Mikhailov of Moscow was elected to the International Astronomical Union's Executive Committee The other six members are from the United States, England, France, Holland, Italy, and Sweden

The international astronomical bureaus, suspended during the war, are being reestablished with much of the former German activities going to Russians

The British astronomer royal, Spencer Jones, presided at the meetings, at which the American delegation consisted of Dr. Shapley, Dr Otto Struve of Yerkes Observatory, and Dr Joel Stebbins of Washburn Observatory

Science News Letter, March 30, 1946

PSYCHOLOGY

"Lie Detector" Doesn't

Reportedly used at Oak Ridge to trap those stealing U-235 or telling atomic secrets, it is an instrument of third-degree, not scientific crime detection.

➤ THE SO-CALLED "lie detector", reportedly used to trap those stealing uranium 235 or selling atomic secrets, is an instrument of third-degree intimidation, not of scientific crime detection Its evidence is not generally accepted in courts of law.

The "lie detector" does not detect lies It only shows up the emotional excitement of the victim This is done by measuring respiration, blood pressure and the electrical resistance of the skin

When you are scared, or angry, or embarrassed, your heart beats faster, your breath is quickened and moisture is likely to break out on your forehead or the palms of your hands And since the moisture of your perspiration changes the way in which your skin conducts an electric current, the "lie detector" tells your questioner all about your uncomfortable feelings Although you may try to preserve a poker face, it is difficult to control heart rate and perspiration So the questioners may literally "sweat it out" of the unhappy suspect

Scientists do not rely on the evidence of the "lie detector," however, for the obvious reason that not all persons frightened by third-degree questioning are liars or guilty of crime

Any worker at Oak Ridge might very well be terrified at being accused of stealing U-235 in this day of spy scares Or he might be violently angry at this accusation of dishonesty and traitorous behavior

On the other hand, a psychopath or professional liar may feel no emotion at all at his own falsehoods and the "lie detector" would give such a person a perfect score for truth

The instrument is not a product of the atomic age Although it may have been modified during the years, the same sort of instrument has been known and in limited use for some twenty years or more During that time it has not been established as generally useful

Evidence obtained by the "lie detector" has never stood up in courts of law In a few cases, it has been accepted by lower courts, but has not withstood appeal.

Chief usefulness of the gadget is as an aid to the police in scaring an ignorant or superstitious person into making a confession of crime An empty black box, if it looks mysterious, would serve the same purpose—and has been used for it.

Science News Letter, March 30, 1946

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ENGINEERING

Faster Production of Steel Sheets Contemplated

➤ FASTER production of the flat steel plates on which the automotive industry heavily depends is contemplated in a new mechanical setup on which U S patent 2,397,029 has been issued to W H McLaughlin and G H Rendel of Gary, Ind , assignors to the Carnegie-Illinois Steel Corporation

The big rolls of sheet metal, as they are delivered from the continuous-strip mill, are unreeled first through two sets of rollers that stretch the web tightly, thus straightening it Thence it goes through a trimming machine that crops its edges straight, then through another series of rollers that give it a final flattening Finally a massive pair of shear blades cut it to the desired lengths

Science News Letter, March 30, 1946

"... from classical concepts to ATOMIC REALITIES."

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by Pascual Jordan

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New Machines And Gadgets

⚙ *OPTICAL micrometer measures the thickness in central sections of large sheets of glass or transparent plastics It is a microscope focussed on a chalk-mark on the opposite side of the material, while its nosepiece rests on the front side Micrometer readings on its barrel give the thickness*

Science News Letter, March 30, 1946

⚙ *HEMISPHERICAL parachute, that looks like half a baseball as it floats in the air, drops without the characteristic swaying or oscillation of the conventional type It has a unique shock-absorbing hem cord that enables it to withstand the opening impact when used with a load from a speedy plane*

Science News Letter, March 30, 1946

⚙ *OVERFLOW STOPPER for kitchen sinks permits surplus water to escape in a too-full sink Waste coffee or other liquid may also be emptied into the waste pipe without removal of the stopper It consists of an open upright tube with an annular rubber flange that holds the device in place by suction*

Science News Letter, March 30, 1946

⚙ *TOY TOP, made of transparent material and containing liquids of different color and density, changes color as the top spins and the liquids are mixed by centrifugal force. Vanes inside the recently patented top cause the liquid to rotate when spinning motion is initially given to the toy.*

Science News Letter, March 30, 1946

⚙ *DIRECT-READING compass, developed for the armed services, is now available to civilians It is a combination*



compass and matchbox, as the picture shows Its principal advantage is that the user, by looking through a small side window, can determine at a glance the direction he faces

Science News Letter, March 30, 1946

⚙ *ERASING attachment for a typewriter, that erases without removing the copy from the machine, is operated by a special key on the keyboard When the key is depressed, the eraser strikes the paper It is a belt stretched over a tiny wheel which is mechanically operated by the impact blow*

Science News Letter, March 30, 1946

⚙ *INCUBATORS for infants are now made of transparent plastics with a clear top and sliding panels. The baby is always visible, and can be observed without disturbing him or the scientifically controlled humidity and temperature inside. When necessary he can be reached by sliding a panel*

Science News Letter, March 30, 1946

⚙ *FIREFIGHTING plow, to break the soil in front of forest fires, is an implement of the middle-buster or two-way type that plows a clear double 28-inch furrow A set of wings and disks spreads the loosened soil to cover the vegetable litter on each side of the furrow.*

Science News Letter, March 30, 1946

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Science News Letter, March 30, 1946

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Question Box

AERONAUTICS
Where is the largest wind tunnel in operation? p 194

ASTRONOMY
What four planets are visible these evenings? p 202

DENTISTRY
How great is the hope that penicillin may fight tooth decay? p 200

ELECTRONICS
How is it possible to test velocity and accuracy simultaneously? p 204
What is "walkie-lookie"? p 195

MEDICINE
How great has been the reduction in the number of people dying from appendicitis? p 200.
What drug has been successful in treating bichloride of mercury poisoning? p 200
What new antiseptic solution is offered? p 194

METALLURGY
What new development will increase the uses of metallic titanium? p 197

METEOROLOGY
What may be a clue to the past history of iron meteorites? p 201.

NUTRITION
What method of cooking saves vitamins? p 203

PSYCHOLOGY
Why is the evidence supplied by the "lie detector" not accepted in courts of law? p 198

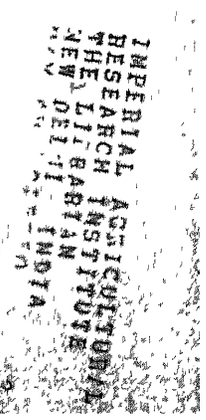
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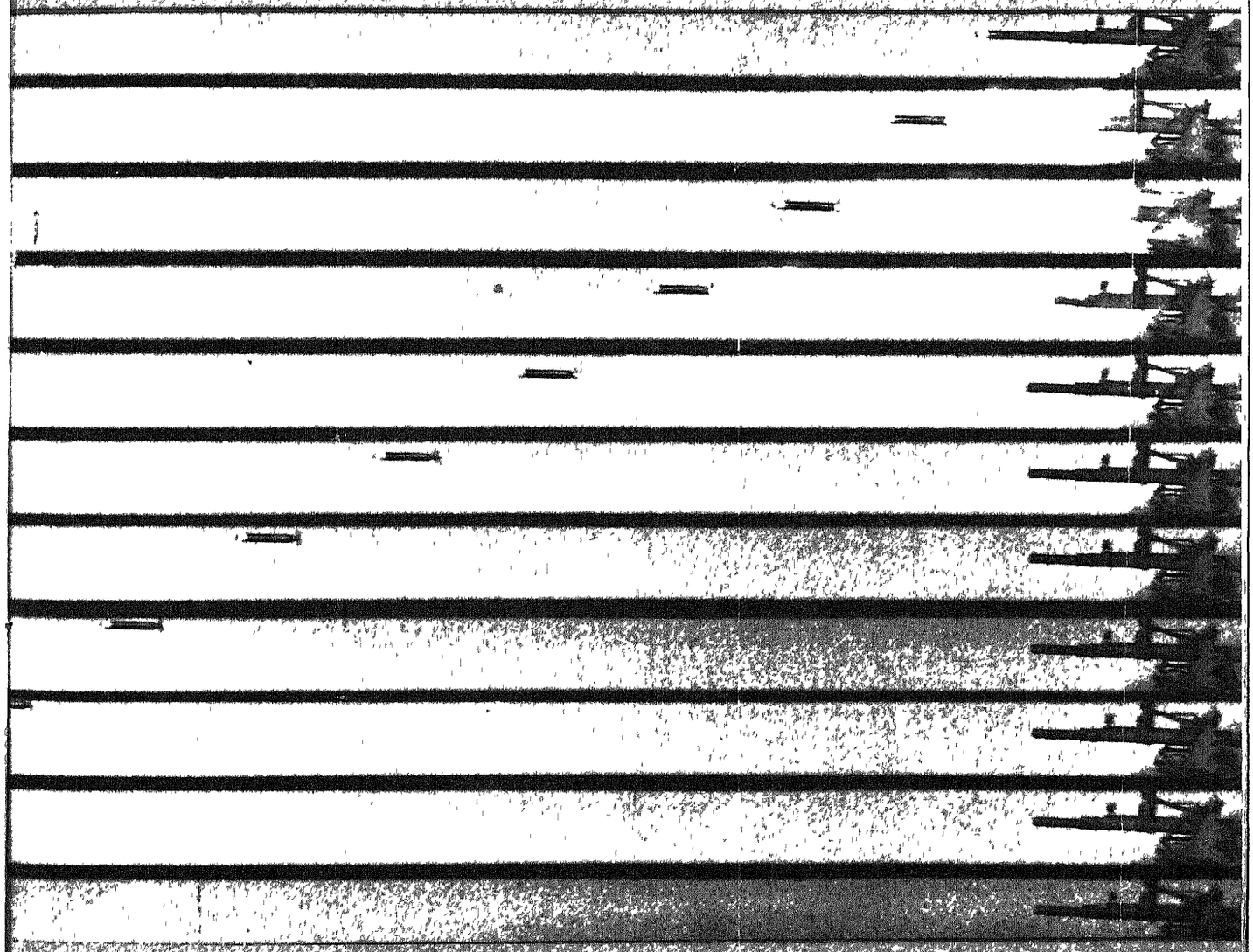
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SCIENCE NEWS LETTER

Vol. 49, No. 14

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 6, 1946



Launching A Rocket

See Page 218

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946

GENERAL SCIENCE

Scientists and Peace

They ought to do their share toward organizing a saner world, retiring president of the American Association for the Advancement of Science states.

➤SCIENTISTS ought to do their share towards organizing a saner, more peaceful world, because their training qualifies them to see things more objectively and should enable them to decide and act with less prejudice and passion, Prof Anton J Carlson of the University of Chicago declared in his address as retiring president of the American Association for the Advancement of Science

Prof Carlson specifically disclaimed for scientists any monopoly in wisdom, and admitted that as human beings they are exposed to the same pressures, fears and hopes as everyone else

"All we can hope for ourselves," he said, "is that we apply a somewhat larger element of the integrity, gained in science, in our common life as citizens of our nation and of the world"

Taking as his text a saying of George Washington's, "Let us raise a standard to which the wise and the honest can repair," the speaker sought a scientist's definition of an honest man. He proposed:

"Man—that is, the human race—has dwelt on this earth at least a million years It seems to me it is high time that those who would be wise should look ahead as to the consequences of their individual, national and international actions, not only today and tomorrow, but a hundred, a thousand, a hundred thousand years ahead

"As I see it, the person who has developed some control of his greed, his vanity and his fears, who has developed to the limit of his brain the accumulated understanding of man and the universe, and who thinks in terms of his fellowman—that is, the human race—not for the day, for tomorrow, or even the next hundred years, but for a future at least as long as our human past, and who at the same time uses all his influence, without violence or coercion, to prevail on his fellowman to follow his example, that individual is entitled to the connotation 'wise'."

If no more than a corporal's guard of such persons can be found in each country, Prof Carlson expects that they will eventually be able to leaven the lump of the present chaotic world, with its pious professions in Atlantic Charters and the aims of the UNO, and the great nations' incompatible lying diplomacy and truculent rearmament

Even if war should come again, it would not mean the end of the human race, he prophesied It would merely wreck and retard our industrial civilization The worst dangers to the human race, he declared, are not atom bombs but "slavery, parasitism, chicks that chirp but don't scratch"

In conclusion, Prof Carlson looked toward a time when man's social behavior will become the subject of a real science, which will in turn lead to better and more efficient guidance of our everyday affairs·

"Some day our colleagues in the social sciences, by the methods and ethics known to work in the natural sciences, will provide man with data on human behavior, data as reliable and as unavoidable as are the confirmed data of chemistry and physics of today When that day is here, guile and guess in human relations will surely recede, assuming that man of that era retains present mental capacities"

Science News Letter, April 6, 1946

ASTRONOMY

Knowledge of Milky Way Greatly Extended

➤ KNOWLEDGE of the Milky Way in the region of the Northern Cross has recently been extended some 4,000 light years, or almost 23,500,000,000,000,000 miles, through use of a new objective prism with the Schmidt-type telescope Dr J J Nassau of the Warner and Swasey Observatory, Case School of Applied Science, reported to the American Association for the Advancement of Science meeting

In the Milky Way, in the direction of the constellation of Cygnus, the swan, there is at least one cloud of highly luminous blue stars, from seventh magnitude, just too faint to be seen with the naked eye, to stars as faint as the 13th magnitude Imbedded in this cloud of stars is a mass of obscuring interstellar material which does not interfere with the light of the nearby stars, but definitely diminishes the number of faint or distant stars



PROF. A. J. CARLSON

visible, Dr Nassau and Daniel Harris found

The spectra of many stars, some fainter than the 12.5th magnitude, can be photographed simultaneously by means of the new four-degree objective prism attached to the Warner and Swasey Schmidt camera A two-degree prism just put into use last month with this same telescope makes it possible to explore even farther into interstellar space With it spectra of stars nearly as faint as magnitude 13 5 can be obtained

Light from the stars, separated into spectrum lines, helps astronomers to determine the nature of the stellar radiations, surface temperatures, stellar motion and velocity, and the mass and density of the stars.

Made of dense flint glass, the new two-degree objective prism is 24 inches in diameter with a graduated thickness from 0 75 to 1 50 inches, producing an angle of two degrees, Dr Nassau told the association section on astronomy The spectra of the stars are less than 0 1 of an inch in length, but it is possible with this prism accurately to classify stars as well as obtain their intrinsic brightness. With a 20-minute exposure, spectra of stars of the 13th magnitude can be photographed readily

Basically, a Schmidt instrument is a spherical mirror before which is placed a thin glass correcting lens This makes possible with the astronomical instrument photographs of large regions of the sky far superior to those taken with ordinary lens-type cameras

Science News Letter, April 6, 1946

CHEMISTRY

New Elements Synthesized

Four chemical elements, 43, 61, 85, 87, produced and investigated by tracer technique. Tracers seen as having unlimited possibilities in research and disease.

➤ THE PRODUCTION by artificial means of four chemical elements, numbers 43, 61, 85, and 87, now known to be extremely rare or non-existent in nature, was made known by Dr Glenn T Seaborg, professor of chemistry at the University of California and codiscoverer of the elements plutonium, 95 and 96 during atomic bomb research, in an address to the physical chemistry section of the Pittsburgh section of the American Chemical Society.

With the manufacture and investigation of the properties of these four elements, all the gaps in the table of chemical elements have been closed. Although all four of these elements have been reported discovered in earlier years by various experimenters, the researches reported by Dr Seaborg call in question these earlier reports based on less positive methods of analysis

Actually the experiments with these elements have been performed with unseeable and unweighable amounts by means of the "tracer" technique The course of the elements in reactions is followed by their radioactivity instead of by chemical means

Radioactive isotopes of element 43 were produced by the bombardment of molybdenum with deuterons, the nuclei of heavy hydrogen atoms Experiments by Drs C Perrier and Emilio Segre showed that the chemical properties of 43 resembled those of its heavier homolog, rhenium, to a greater extent than they resembled those of manganese, the lighter element most resembling it

Radioactive forms of element 61 were formed in experiments by both Drs J D Kurbatov and Marion L Pool and Drs C S Wu and Emilio Segre This element is a rare earth, with a behavior that is to be expected from a rare earth

Radioactive element 85, whose isotope has an atomic weight of 211, was made by bombarding bismuth with 32,000,000 electron-volt alpha particles Its general behavior is that of a metal, with little resemblance to the other halogens, of which iodine is typical Drs Dale R Corson, K R Mackenzie and Emilio Segre investigated its properties

A radioactive form of element 87, given the name AcK, has been discovered resulting from the decay of actinium This isotope discovered by Dr M Perey has a mass of 223 and lives but a short time It decays with negative beta particle emission with a half life of 20 minutes As was expected, it behaves like a heavy alkali metal

(Earlier reports of the discovery of these elements, now called in question, were made, in the case of 43, named masurium, in 1925, and element 61, named illinium, in 1926, while 85, called alabamine, and 87, called virginium, were announced in 1931 The chemical literature records several earlier claims of finding some of these elements)

Rival Microscope

➤ UNLIMITED possibilities for the application of radioactive tracers to scientific problems and to the treatment of disease were foreseen by Dr Seaborg

"Many biologists believe that artificial radioactivity has given biology and medicine," said Dr Seaborg, "what is probably the most useful tool for research since the discovery of the microscope because all the elements and compounds in biological system can be tagged and their course through living systems studied"

The chain reacting pile used in the production of plutonium for the manufacture of atomic bombs produces large amounts of neutrons of high intensity and as a result it is possible to produce in large quantity isotopes that are used as "tags" or "tracers"

One of the most useful of the isotopes thus made is radioactive carbon 14, which has a half-life of some thousands of years. Since carbon is so important in the living world, being able to tell where a carbon atom travels and what it does by spying upon it with an apparatus that spots its explosive decaying will give scientists new information on what happens during living and chemical changes

Radioactive triple-weight hydrogen, atomic weight 3, can now be produced by means of the intense neutron sources in the atomic bomb manufacture It has a half-life span of 30 years and it can be used effectively to label hydrogen in organic compounds both in chemical processes and in living things, normal or diseased

Radiophosphorus, radiosulfur and radioiodine are among the other radioactive isotopes that, according to Dr Seaborg, will offer many opportunities for important research

One exciting finding is that radiophosphorus accumulates in leukemic tissues, thus opening the possibility that it can be used in the treatment of this cancer-like disease of the blood cells The radiophosphorus would bombard the diseased tissues with beta rays to a greater degree

The study of cancer is another possible use of tracers As in the case of leukemia, Dr Seaborg explained, "there is the therapeutic possibility of effecting the selective deposition of the radioactive material in the cancerous tissue"

"It has occurred to many investigators," he reported, "that it should be possible in the future to synthesize some compound containing a radioactive substance, this compound having the property of being selectively absorbed by the cancerous tissues so that the radioactive rays can act directly at this spot without giving harmful effects on the body's healthy tissue"

Tagging of bacteria with radioactive carbon 14 is a possibility, Dr Seaborg declared A beginning has been made by tagging the tuberculosis bacillus with radioactive phosphorus but the experiments have not yet been completed

Radioactive iodine has been used in the treatment of patients suffering from hyperthyroidism by Drs J. G Hamilton and M H Soley, while Dr J. H Lawrence has been successful in the application of radioactive phosphorus to the temporary control of the blood disease, polycythema vera

Industry will also benefit from radioactive materials resulting from the atomic bomb researches and the manufacture of plutonium, Dr Seaborg predicted Radioactive indicators will be used to follow the course of products and impurities in large industrial processes

As an example of one chemical problem that could be studied with carbon 14, he cited the mechanism of catalytic cracking, isomerization and alkylation of hydrocarbons which are of profound interest to the oil industry.

Radioactive tracers may also help solve fundamental problems in genetics, such as the connection between the genes in the chromosomes that cause brown eyes and the actual deposition of the pigment in the cells of the iris

PHYSICS

Plutonium "Denatured"

Best guess as to meaning of State Department hint is that it is done by mixing with a material to form a combination that will not explode.

By WATSON DAVIS

➤ THE STATE Department committee report on atomic energy control lifts slightly some of the secrecy surrounding atomic fission and atom splitting, but the scientific world still lacks data that in the normal course of peacetime science would be published for the world to know

Most interesting is the hint that plutonium, one of the atomic bomb elements (the other being uranium 235), can be "denatured"

Guessing as to how this could be done (and, please, Gen Groves, note that this is my guess only, which I hope does not come under Army security) it may be that the plutonium that fissions explosively could be so contaminated with another non-fissionable isotope of the same element that it could not be exploded Possibly separating the fissionable isotope useful in bomb making would be a much more difficult task than separating out the bomb element from the material with which it is mixed during its manufacture from uranium 238 This separation is one of the major tasks of the gigantic plant at Hanford, Wash

Unless the plutonium is sufficiently pure and undiluted by extraneous materials, there will not be enough neutrons to produce the violent and extremely fast chain reaction of the atomic bomb explosion Each splitting plutonium atom gives out from one to three neutrons, but these must have the chance to reach other fissionable plutonium atoms in a very short space of time without being absorbed and made useless for that purpose

Many kinds of materials can produce this necessary dilution, but the point in control of plutonium if it were distributed for peaceful power producing uses is that the diluting or denaturing material must be very difficult to separate from the fissionable material. Otherwise a few chemically-wise international gangsters might take improperly denatured plutonium and turn it into purified fissionable plutonium and the first the world would know about this would be the explosion of an atomic bomb.

Another item in the State Department report being studied by the Senate Special Atomic Energy Committee emphasizes more plainly than before that thorium can be the source of fissionable material This has been implied in the Smyth report, but just what process is used has not been stated Evidently thorium with the aid of uranium may be transmuted into fissionable atomic bomb material, just as plutonium can be manufactured from uranium isotope 238. It is for this reason that thorium as well as uranium needs to be placed under control if the atomic bomb is to be controlled

Thorium is a fairly common element in the earth's crust, but deposits of it are presumably not so concentrated or easily used as those of uranium.

Science News Letter, April 6, 1946

Another Major Secret

➤ ANOTHER MAJOR secret has been added to the world's lack of information about the atomic bomb This is the nature of the denaturing material used to make uranium 235 or plutonium incapable of being turned into an explosive bomb This contaminating material is something that has been known about for several years during atomic research. Its possible use in solving the difficulties of making atomic bomb materials available to the world has just been announced in the State Department's report on the international control of atomic energy Its removal from the denatured fissionable material would take a large and lengthy manufacturing operation

The purpose of the denaturing is to put all the bomb making materials of the world in such a state that only after a lapse of 1½ to 5 years, depending upon the estimates involved, could an atomic bomb be made out of the material This would allow the distribution, under the proposed Atomic Development Authority plan, of ample quantities of uranium materials that could be used for peaceful production of power.

The evident purpose of keeping the denaturing substance a secret now is to have more unrevealed information to be presented to the United Nations when they accept international control If the plants and mines producing uranium and thorium are owned by the United Nations, the first step in the relinquishing of national sovereignty has been taken

The world could best have atomic power for industry and other purposes without the menace of atomic bomb sneak attacks if the sources of atomic power, the world's resources in uranium and thorium, were put under international control by UNO The international organization would operate the plants through the stage at which the products could be diverted to the making of atomic explosives, and would turn out the denatured product which is safe to use for all legitimate research purposes If any of the so-called dangerous plants manufacturing U-235 or plutonium were sud

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denly seized by any nation and thus removed from the control of the United Nations, that would be a virtual declaration of war because the seizing nation, if left alone, within a year or two, could produce an atomic bomb An essential part of the control by the United Nations of fissionable material would be the ownership and operation of all deposits of uranium and thorium and the plants for extracting these elements A first step would be an extensive geological exploration of the surface of the earth to discover all deposits of uranium and thorium

Uranium and thorium are the only two elements, according to the report, which need to be controlled because without them no fissionable materials could be made

The scientists working on the questions of whether other elements can produce atomic energy by a sustained reaction have relied greatly upon what is called the "packing curve," according to Dr Charles Allen Thomas, vice president and technical director of the Monsanto Chemical Co, one of the members of the board of consultants to the State Department's committee, here According to theory developed from the packing curve, only the heaviest nuclei and the lightest nuclei have the subatomic configuration which would allow them to release atomic energy

While the light atoms do furnish the energy that keeps the stars shining, the scientists who provided information for the report see no practicable way either to provide the millions of degrees of temperature necessary or to create the containers for materials at such temperatures under terrestrial conditions, so they have discarded the possibility of obtaining energy from the disintegration of these light elements

One essential idea in the report is the distribution of stock piles of fissionable materials and the "dangerous" plants manufacturing fissionable materials throughout the world so that every major region contains them. Thus no one country or region would have a monopoly

Science News Letter, April 6, 1946

CHEMISTRY

Uranium Is Vital Factor

It is the only essential element for constructing an atomic bomb, but thorium may also be used in chain reactions, report reveals.

➤ URANIUM STANDS OUT as unique among the 92 naturally occurring elements, according to new information released in the State Department's Report on the International Control of Atomic Energy Only uranium can maintain the chain reaction which is the basis for all development of atomic power, whether for peace or war.

Uranium is one of eight or nine heavy, radioactive elements about which there has been speculation ever since the announcement last August of the principles of atomic fission In particular, the role of uranium's sister element, thorium, largely used to make self-luminous watch dials and light switches, has evoked curiosity

In the new report it is revealed that thorium cannot of itself maintain a chain reaction, but it can be used with uranium for that purpose It could, in effect, be used to stretch the uranium supply Thorium is therefore included with uranium under the restrictive provisions suggested in the State Department's report on atomic energy control.

The fact that thorium and uranium frequently occur together in the same geological formation greatly simplifies this plan for control by international authority of the sources of fissionable material Moreover, the type of geological formation where these strange minerals occur is unusual and relatively easy to spot

We have the authority of the scientists who know all the secrets of atomic energy so far discovered that these elements, thorium and uranium, are the only ones over which it is necessary to maintain a watch to insure their use for constructive purposes Familiar materials, such as iron and lead, may be used freely in construction of atomic power plants, with no danger of producing bombs as a by-product Nobody is going to get fissionable atoms out of the clay at our feet.

With the world's supply of the dangerous elements, uranium and thorium, and their artificially created analogues, neptunium and plutonium, under international control, the race for fissionable elements as weapons would end in stalemate At the same time, their use as sources of power and as research tools would offer stimulating opportunity for untrammeled investigation by scientists of all countries

New power sources, secrets of nature's production of food and fuel, and new hope in our struggle to understand and control cancer are some of the constructive problems awaiting settlement of the dangerous side of the atomic power question

Science News Letter, April 6, 1946

Control of Cancer Instead of Atomic Bombs

➤ CONTROL OF CANCER instead of manufacture of bombs is the alternative program offered research scientists by the new report on international control of atomic energy issued by the State Department Research on atomic fission by-products, although not as spectacular at first glance as atomic power or atomic bombs, will undoubtedly, in the long run, be the great achievement of the atomic age.

These by-products, which are the radioactive forms of the common elements, can replace the non-radioactive forms of the same elements in the tissues of plants and animals By substituting them for the common forms, individual atoms can be traced through the complicated maze of life processes in plant, animal or man. By this means, chemists are learning the steps by which the plant builds carbon dioxide from the air into the starches and sugars on which we rely for food Selective absorption of radioactive materials by cancer tissues can be used to place the remedial rays given off by these materials in the tissues they are to treat

Researches of this type, already begun by scientists in the atomic power research program, have been greatly hindered by restrictions growing out of secrecy conditions deemed necessary on account of the military control of atomic power as a weapon With the establishment of international control which will limit use of dangerous fissionable material but allow safely denatured material to be released for experimental use, great strides in man's control over his environment are to be expected

In addition to the radioactive fission products which will play so important a part in chemical and physical researches in the atomic age, there will be developed from the atomic fission reactors considerable quantities of heat which may be usefully employed either for operating steam plants or for generating electricity An earlier report of

the Secretary of War's Interim Committee on Atomic Energy, whose findings are in part incorporated in the statement just released, considers the present prospects for utilization of this power

"We see characteristic limitations," says this report, "and characteristic advantages in atomic power which make us regard it in great measure as a supplement to existing sources, and an incentive to new developments, rather than as a competitor, let us say, to coal or to petroleum products"

Science News Letter, April 6, 1946

GENERAL SCIENCE

International Control

An agency actively working on developments in the field of atomic energy is urged by State Department consultants for peaceful control.

➤ CONTROL OF ATOMIC energy by an international agency actively working on development in the field is the proposal handed the State Department by its board of consultants for peaceful control of man's most fearful weapon.

The 78-page report of the five-man board was released with a foreword from Secretary of State Byrnes stating that it is being made public "not as a statement of policy but solely as a basis for discussion."

The chairman of the board was David E Lilienthal, chairman of the Tennessee Valley Authority, and it included Chester I Barnard, president of the New Jersey Bell Telephone Co; Dr J. Robert Oppenheimer, University of California and California Institute of Technology scientist who directed work at the Los Alamos, N Mex, laboratory of the Manhattan District, Dr Charles Allen Thomas, vice-president of the Monsanto Chemical Co, St Louis, Mo, and Harry A Winne, vice-president of the General Electric Co, Schenectady, N Y

Pointing to the need for international control of the atomic weapon, the report introduced a new concept of the problem by asserting that "only if the dangerous aspects of atomic energy are taken out of national hands is there any reasonable prospect of devising safeguards against the use of atomic energy for bombs." It explains the difference between safe and dangerous activities with a promise that there are processes for utilizing radioactive materials that cannot be made into bombs

The State Department's consultants emphasize that the group exercising international control must also assume a responsibility for the development of atomic energy

"Only if the international agency was engaged in development and operation could it possibly discharge adequately its functions as a safeguarder of the world's future," the report declares

New advances in technology may be confidently expected, the board said, and "Those in whose hands lies the prevention of atomic warfare must be the first to know and to exploit technical advances in this field"

Explaining that atomic energy cannot be policed out of existence, the group charged, "To 'outlaw' atomic energy in all of its forms and enforce such a prohibition by an army of inspectors roaming the earth would overwhelm the capacity and the endurance of men, and provide no security"

Comparing the enforcers of such a suppression to prohibition agents in the United States, the report urges the control body to be pioneers in a new and creative field Referring to the unpublished findings of the Secretary of War's Interim Committee on Atomic Energy, the State Department document quoted portions predicting important peacetime uses for the war's mightiest weapon

With the materials for atomic weapons kept out of national hands we can prevent war use of them, the report said, adding that the international agency must have absolute control over the raw material

Thus, the board declared, the problem of enforcement is drastically reduced The technical problems of what use a nation is making of dangerous materials will not enter into the control if the mining of uranium ore or possession of it are illegal, according to the State Department's consultants

Summing up their case for international control of atomic energy, the board said, "We conclude that the international development and operation of potentially and intrinsically dangerous activities in connection with atomic energy would bring the task of security within manageable proportions because of the elimination of the hazards of rivalry between nations"

Individual nations and their citizens would be licensed to carry on all safe operations with a minimum of inspection, according to the plan

First function of the proposed agency would be to bring under its control all supplies of uranium and thorium and set up continuous surveys to locate new sources

Plants such as those at Oak Ridge, Tenn, and Hanford, Wash, might be established to produce useful types of atomic reactors to further the peaceful development of atomic power Research activities are contemplated to increase knowledge of atomic energy and extend its safe uses

All dangerous products would be under the agency's strict control, but "denatured" materials could be leased to nations or individuals for safe uses

"When the plan is in full operation there will no longer be secrets about atomic energy," the board said.

"We believe that this is the firmest basis of security," the group declared "In the long term there can be no international control and no international cooperation which does not presuppose an international community of knowledge," they concluded

Science News Letter, April 6, 1946

MEDICINE

Penicillin Is Better Than Streptomycin for Syphilis

➤ PENICILLLIN is better medicine for syphilis than its sister-antibiotic, streptomycin, it appears from studies of rabbit syphilis reported by Dr Wolcott B Dunham and Dr Geoffrey Rake, of the Squibb Institute for Medical Research (*Science,* March 22.)

Streptomycin did cure some of the rabbits of their syphilis, but comparison of the dosage needed with the dose of penicillin that would cure syphilis led the scientists to conclude that "penicillin G is more than 3,000 times as effective" as streptomycin

Treatment of four cases of syphilis in humans, reported by Dr W E Herrell and Dr D. R Nichols of the Mayo Clinic, and referred to by the Squibb scientists, seems to bear out the results of the rabbit studies The human patients improved but relapses occurred even when 10,000,000 units of streptomycin had been given over a period of 10 days

Science News Letter, April 6, 1946

Sound travels more than four times as fast through water as through air.

GENERAL SCIENCE

Blind Spots of Science

Science Service director calls for exploration of longer life, viruses, human personality, chemical elements, universe, photosynthesis, protoplasm, automatism.

➤ MAJOR BLIND spots in man's scientific knowledge, unknowns that are worthy of science's most skillful and energetic probings, were listed by Watson Davis, director of Science Service, in a paper before the American Association for the Advancement of Science

These constitute the stuff of the future upon which technologic advances will be based, Mr Davis declared, provided scientists are released from the inhibiting secrecy in which the military wish to continue to ensnare them

The ten major unexplored areas listed by Mr Davis are.

1 Living longer the prolongation of life, the retarding of old age, the prevention of premature senility, which means the conquest of degenerative diseases, among them cancer, heart and circulatory disorders, nephritis, arthritis, and diseases of the respiratory system and the brain We should be able to live and work a half generation longer

2 Virus conquests least controlled of all infectious diseases those caused by viruses, such as colds, poliomyelitis, need their nemeses, their sulfas and antibiotics

3 Healthier personalities mental ills, ranging from chronic grouches to disabling psychoses, take major tolls Disordered personalities have physical, mental and emotional bases Mentally warped personalities give rise to crimes against society, including making of wars

4 Exploration of the elements new chemical elements are still to be discovered, probably a half dozen or so Transmutations (not alone of uranium) and properties of older ones need exploration. Undiscovered sources should be sought for elements little-used because scarce Particles within the atomic nucleus yet unidentified may exist.

5 Exploration of the universe the impact of astrophysical knowledge of the universe around us may be more philosophical or religious than technologic, but sun, stars and galaxies have their down-to-earth effects Experiments of immense time and size are in progress

6 The secret of photosynthesis· despite the energy released from within two atomic nuclei, our main source of energy is the sun, whose radiation is converted by photosynthesis in growing plants, a process we do not understand and can not duplicate in any factory

7 The secret of protoplasm the living cell is the seat of life itself An explanation of its protoplasm may explain life Nuclear chemistry of the living cell may be more revealing than nuclear chemistry of the elements

8 Automatism the lever, wheel and such simple devices were beginnings, steam, electrical and internal combustion engines were further steps, the electron tube is the prime servant of automatic operation today, peaking in complex electronic computing machines that almost think in a routine way Automatic operation applied to factory, farm and home, assuming the burden of human drudges, may give time for more creative thinking and doing

9 World brain· civilization's memory is in its records, its books, its literature, its handed-down lore and customs Overburdened human brains forget Our world organization or disorganization of knowledge has its lapses of incomplete records, its Babel of languages, its geographical stagnation, its confusion of classification and its overpowering bulk The intelligence of the world may be intelligent enough to mobilize for use its intelligence

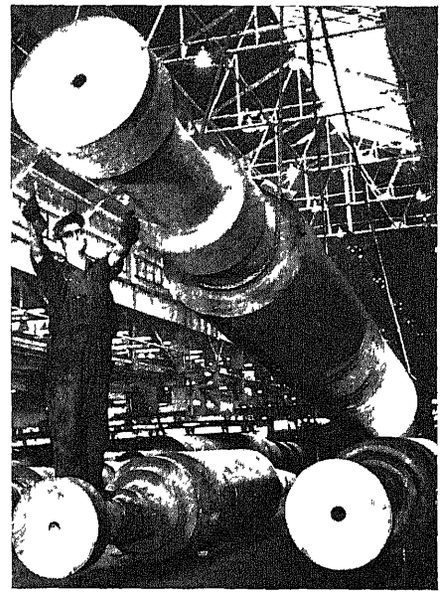
10 Psychological welfare in the stress of war, all the skill of psychological interpretation (propaganda, if you will) and all the machinery of mass communication are devoted to world-wide mutual understanding (of our side) This psychological warfare needs to become peaceful psychological welfare, a process of peoples knowing and understanding within and across man-made borders This will be the essence of peace, which history shows is one of the greatest of unknowns, worthy of the most intense and earnest scientific research.

Science News Letter, April 6, 1946

ELECTRONICS

Largest Turbine Generator Is Under Construction

➤A GIANT, 100,000-kilowatt turbine generator, largest of its type in the world, is now under construction at the General Electric Company's turbine factory in Schenectady, N Y



HUGE FORGING—Many weeks of highly-skilled work will be required to transform this 75,000-pound forging into a precision-machined shaft, which will operate at 3,600 revolutions per minute. It will be used on the huge turbine-generator under construction by General Electric. Parts of the turbine known as "buckets" will operate at the supersonic speed of nearly 900 miles per hour.

Designed to operate at 3,600 revolutions per minute, the streamlined generator will be 77 feet long and 17 feet in maximum width Turbine buckets on the generator will rotate at the record velocity of 1,300 feet per second or nearly 900 miles per hour

Steam, entering the turbine at 1,00(degrees Fahrenheit with 1,250 pounds of pressure per square inch, will pass through a series of bucket wheels rotating the turbine rotor and driving the huge generator

In one-tenth of a second, the steam's temperature drops to about 70 degrees Fahrenheit and the air pressure becomes a near vacuum The steam becomes water and goes back into the power plant system to again be heated into steam

Huge rough castings are used in the construction of the generator which is being built for the Public Service Electric and Gas Co , New Jersey. The forging for the generator shaft weighs 75,000 pounds

Science News Letter, April 6, 1946

CHEMISTRY

Carrots Lose Rank as Source of Vitamin A

➤ THE AMERICAN diet may be subjected to some overhauling as a result of University of California experiments which indicate that the transformation of carotene into vitamin A in the animal body is only one-sixth as efficient as has been assumed

Until recently scientists believed that 100% of the carotene in vegetable foods such as carrots and lettuce was converted into vitamin A

Preliminary experiments at the University of California by Dr Agnes Fay Morgan, professor of home economics, and Lillian S. Bentley, a researcher, reveal that the guinea pig, who seldom eats anything but greenstuffs, can use vitamin A from animal products such as liver and butter six times as efficiently as he can carotene from vegetables

After depleting two sets of animals of vitamin A, Dr Morgan fed one group the same amount of vitamin A from animal products as she did carotene to the other group Examination of their organs after they were sacrificed showed that the vitamin A group stored six times as much vitamin A as the carotene group

Dr. Morgan says that the herbivorous guinea pig should be one of the most efficient users of carotene for vitamin A In view of the facts, she adds, it is probable that other animals, including man, have the same difficulty in transforming carotene This difficulty could be greater in an omnivorous animal such as man.

The experiments indicate it may be necessary to place less reliance on vegetables as a vitamin A source.

Science News Letter, April 6, 1946

BOTANY

Houseflies Used in Search For Better Celery Strains

➤ THE HOUSEFLY, one of our worst insect pests, is aiding man in research which promises to bring better celery to the American housewife's table.

Flies are being raised by plant breeders at Cornell University to cross-pollinate celery plants Bees can be used, but flies are more easily handled

When the flowers are in full bloom the flies are transferred from the rearing cage into a cheesecloth cage which contains the two plants to be crossed. In going from flower to flower to obtain nectar, the only source of food, they bring about the desired cross pollination

The effort at Cornell is to develop a blight-resistant celery When experiments were begun, a celery was being grown in Denmark which was resistant to early blight but was poor in eating qualities This has been crossed with American varieties to produce a celery resistant to early blight and with better eating qualities than one of the parent plants. Similarly, a Florida celery, resistant to late blight, has been used.

Results of these combined crosses are not yet fully completed, but Prof. R A Emerson is confident that within the next five years a blight-resistant celery will be produced which any housewife will be proud to serve on her table

Plants are brought to Ithaca in October and stimulated into immediate springtime growth by cold storage treatment under fluorescent lights for about a month Placed in a greenhouse, they usually produce seeds for planting in April.

Science News Letter, April 6, 1946

PSYCHIATRY

Electric Shock Treatment Impairs Memory

➤ ELECTRIC SHOCK treatment, used widely for mental illness, causes an impairment in both memory and intellectual functioning, Dr Joseph Zubin, of the New York State Psychiatric Institute, reported at the AAAS meeting His conclusions are based on a five-year study of patients taking the treatment at the Institute

The loss in both memory and intellectual functioning occurs after the third shock treatment, Dr Zubin said. Except in a small proportion of cases, the memory loss is gradually restored after the treatments are stopped In the case of the intellectual impairment, however, it is not yet known whether the patient ever regains his level of ability before the treatments

There is a slowing up of learning ability after about the third treatment Memory, in the sense of ability to recognize, is not much affected except for those things only recently observed But ability to recall is severely impaired

A patient may recognize a procedure without having any feeling of having done it or seen it before When asked to do a task he has previously learned, for example, he will deny any knowledge of how to go about it It is completely new to him and he claims that what he does is just guess But his "guess" is correct more than 90% of the time.

Science News Letter, April 6, 1946



CHEMISTRY

DDT May Be Outmoded By Chemical Relatives

➤ DDT, ONLY NOW coming into general public use as a defense against insects, may presently be rivalled or outmoded by close chemical relatives that are even more deadly, it was suggested in a report of researches presented at the AAAS meeting by Dr Eugene P. Odom and Prof W T Sumerford of the University of Georgia.

What the two zoologists were hunting for was a chemical like DDT that would be less deadly to fish, and still able to kill insects Fisheries men, and conservationists generally, are much concerned about ill effects of DDT sprays and dusts distributed over inland waters to kill mosquitoes.

Dr Odum and Prof. Sumerford used compounds resembling DDT, except that the chlorine atoms in the DDT molecule were replaced with the related elements iodine and fluorine. The fluorine-containing compound was even more poisonous to fish than DDT when used in the same concentration However, its deadliness to insects was increased to an even greater extent, so that there may be some hope of finding a concentration that will wipe out the mosquitoes and their "wigglers", and yet not prove fatal to the fish.

Science News Letter, April 6, 1946

GEOLOGY

Pearl Found in Mollusk Of Pleistocene Ice Age

➤ SHELLFISH made pearls a million years ago even as they do today Evidence to this effect is set forth in the *Journal of the Washington Academy of Sciences* (March 15), by Dr. Roland W Brown of the U S. Geological Survey.

Some time ago, digging around in a stratum of Pleistocene ice age date in the face of a river bluff in southern Maryland, Dr Brown found a big snailshell, its cavity filled with mud, which in turn contained numbers of small mollusk shells When these were taken out and cleaned up, one of them, a little less than half an inch long, presented a small nodule of pearly material grown fast to its inner surface

Science News Letter, April 6, 1946



PLANT PATHOLOGY

Spinach Juice Used Against Plant Disease Viruses

➤ SMALL BOYS are not the only creatures that don't like spinach Beings that are much smaller (invisibly small, in fact) are apparently paralyzed in the presence of juice squeezed out of spinach leaves They are the viruses of three different plant diseases, whose reactions to spinach extract were reported before the American Phytopathological Society, meeting jointly with the American Association for the Advancement of Science, by Dr J E. Kuntz and Dr J E Walker of the University of Wisconsin

There appear to be two substances in the spinach juice that have inhibiting effects on viruses They have not yet been isolated and identified, but they have differing chemical and physical behavior, moreover, each attacks one particular virus but does not harm the other

The Wisconsin plant pathologists did not say that their unidentified spinach-juice substances are antibiotics, like penicillin and streptomycin, but their description suggests that their action at least resembles that of antibiotics So long as they are mixed with the viruses in solution, the viruses appear to be without power to produce disease in plants. But the viruses are not destroyed, for if the substances are rendered inactive by suitable physical or chemical means their power to produce disease immediately returns

Science News Letter, April 6, 1946

MEDICINE

Penicillin Can Help Check Streptococcus Diseases

➤ PENICILLIN can help check epidemics of streptoccocus sore throat and possibly other streptococcus-caused diseases, which include scarlet fever, it appears from a report by Dr Morton Hamburger, Jr , of Chicago, and Capt Henry M Lemon, of the Army Medical Corps (*Journal, American Medical Association,* March 30)

The mold chemical can do this because it can in many cases promptly eliminate all the streptoccocci from the noses and throats of healthy carriers of these germs. Spread of the germs from patients can be pretty well checked by isolation of the patients Healthy persons who have the germs in their noses and throats are usually not known to be carrying the germs until they have spread them to many others

Sulfadiazine can check the spread of streptococci from carriers if the streptococci are susceptible to the sulfa drug Some strains of these germs, however, become resistant to sulfa drugs

Penicillin in beeswax peanut oil, injected once a day for five to seven days, promptly eliminated the streptococci from both nose and throat of half the carriers in the group Dr Hamburger and Capt Lemon studied In the other half, the streptococci were eliminated or reduced by more than 98% in number during the period the carriers were getting the penicillin, though after it was stopped, there was a relapse into the carrier state Most of the carriers in whom relapse occurred, however, scattered very few streptococci into their environment

"A method is now available," the two doctors conclude, "for controlling well over half the dangerous carriers in event of an epidemic "

Larger doses of penicillin, they suggest, may eradicate the carrier state from even more persons.

Science News Letter, April 6, 1946

ENTOMOLOGY

DDT Effects Studied on Cockroach's Nervous System

➤ DDT KILLS insects by poisoning their nerves, but it does not act uniformly on all insect nervous tissue Its attack was found to be centered on the afferent, or "ingoing", nerves in experiments carried out by Prof Kenneth D Roeder and Miss Elizabeth A Weiant in the biology laboratories of Tufts College (*Science,* Mar 8)

The two researchers worked on the cockroach, because it is a large insect and has a nervous system that is comparatively easy to reach by micro-dissection and micro-injection methods They got no results from minute quantities of DDT applied to the central nervous system, to special sense nerves, and to the nerves that carry outgoing impulses to the muscles, but when similar applications were made to the neurons, or action centers, of nerves that carry impulses inward from the muscles, they observed the characteristic reactions of DDT poisoning

Science News Letter, April 6, 1946

CHEMISTRY

Nation's Penicillin Supply May Be Doubled

➤ THE NATION'S penicillin supply may be doubled as a result of ultraviolet treatment of the spores of the mold that produces the powerful anti-germ remedy, the Wisconsin Alumni Research Foundation announces

Ultraviolet irradiation, it is explained, causes incompletely understood and unpredictable changes in the genes of spores and seeds with resultant changes in the characteristics of the plants or fungi springing from them X-ray treatment does the same thing

Treatment of succeeding generations of spores of penicillium has resulted in a strain that produces nearly 1,000 units of penicillin from every cubic centimeter of broth in which the mold is cultured In 1940, the yield obtained by the British workers was about two units from the same amount of broth culture

The two-unit yield was increased to an average of 169 by efforts at the U S. Department of Agriculture's Northern Regional Research Station at Peoria, Ill Then Dr Millislav Demerec, director of the department of genetics at Carnegie Institution, Cold Spring Harbor, N Y , developed a group of promising spore variants by X-ray treatment.

This stepped up the yield to an average of 369 units Descendants of these spores were exposed to ultraviolet light by Prof Myron P Backus and Dr John F. Stauffer, University of Wisconsin botanists The yield increased to an average of 761 units, with a high of 904.

The hunt is still on for an even more efficient producer of penicillin A strain that can produce two or five times as much of the remedy is a possibility, because the present high yield probably represents less than 1% of all the chemicals produced by the mold, while other molds are known to produce chemicals as complex as penicillin in quantities equal to 5% or 10%

Scientists besides those named who have worked on the project at the University of Wisconsin include. Prof. William C Frazier, Prof Elizabeth McCoy, Prof W H Peterson and Prof Marvin J Johnson. The work has been supported partly by Federal funds and partly by the Wisconsin Alumni Research Foundation

Soil cultures of the new high-producing strain, called Q176, and unpatented, are being supplied gratis on request to penicillin manufacturers

Science News Letter, April 6, 19

ORDNANCE

New Weapons Disclosed

Kickless mortar, one-shot flame-thrower, flying bangalore torpedo among weapons developed at the Allegany Ballistics Laboratory.

See Front Cover

➤ WEAPONS THAT SAW action only in the closing stages of the war, and have not hitherto been disclosed to the public, were shown before a small group of industrialists and newspapermen at the birthplace of the bazooka, a hidden ballistics laboratory in a bowl in the West Virginia hills just before it terminated its wartime program, several months after V-J Day The place was known as the Allegany Ballistics Laboratory, it was operated during the war by scientists of the George Washington University, Washington, D C, under a contract with the Office of Scientific Research and Development Most of the weapons developed there are now standard Army equipment

The bazooka, earliest and smallest of American rocket weapons, has been supplanted by a superbazooka, a projectile bulkier but more completely streamlined than its ancestor, containing a much larger charge of propellant powder that gives it higher velocity, flatter trajectory and considerably increased range The "payload" of super-high explosive will send a sword of flame stabbing through the thickest of tank armor The series of photographs on the cover of this SCIENCE NEWS LETTER shows the actual launching of a rocket on the proving grounds at the Allegany Ballistics Laboratory

Although the Allegany Ballistics Laboratory was established especially for the developing and testing of new rocket weapons, and many of the rockets that wrought such dreadful execution on the enemy, all the way from Sicily to Okinawa, were first produced there, the laboratory's scientific staff was called on to solve a number of other problems that involved the use of the peculiar, giant-grained propellant powders of the type used in rockets Thus several unique and highly effective weapons have been evolved, that are not rockets at all

Most striking, perhaps, are the recoilless mortars that deliver low-angle, "flat" fire, like cannon They were developed especially to provide a very lightweight but hard-hitting weapon to knock out enemy pillboxes, and were used for this purpose in the last weeks of the war against Japan

Recoil is eliminated as it is in the already-announced recoilless cannon, by leaving openings in the breech, so that enough of the expanding powder gases escape backward to offset the weapon's "kick". So successfully has this been worked out that the heavy base-plate required by ordinary mortars is not needed, the recoilless mortar is mounted on the standard Army machine-gun tripod

Unlike the recoilless cannon, the mortar is a muzzle-loader, with the advantage of rapid fire which that method of serving brings Since the shell cannot be dropped down the barrel when firing is horizontal or at a low angle, a small rocket is screwed into its nose When the gunner pulls the string, this little rocket rams the shell down the barrel The primer in the powder charge secured to its base hits the firing-pin—and out comes the shell again on its way to the target

Another very effective weapon developed at the laboratory is the "one-shot" flame-thrower Most flame-throwers have flasks of compressed air or other gas to push out their jets of inflammable liquid This adds considerably to their weight In the one-shot flame-thrower the necessary pressure is provided by the ignition of a cylinder of slow-burning rocket powder Unlike its heavier forerunner, this flame-thrower cannot be turned on and off, once started, it delivers all its charge in one long, withering spurt This is offset by its much lighter weight, also by the fact that refilling does not involve the use of heavy machinery for compressing air A load of fuel and a charge of powder about the size of a Boy Scout knife are all that is required.

Weapons that are true rockets, yet do not rise into the air, are a group that were developed for the purpose of clearing paths through mine fields by dragging long trains of explosive athwart them, to be set off as soon as they reach favorable positions. One such is called the "snake", a rocket head with an upturned, ski-like snout, trailing two strings of high explosive charges behind it in long, light-metal protective strips In action, the thing reminds one irresistably of the "nigger-chasers" of long-ago Fourth-of-July celebrations—only it is a thousand times bigger And there is a rocket-towed mine-clearer that is even bigger than this, its heavier, more powerful rocket drags a string of bangalore torpedoes, which are lengths of light metal pipe filled with high explosive

The Allegany Research Laboratory was entirely a research, development and testing establishment, the rockets and other weapons and ammunition developed there were manufactured elsewhere Like practically all such wartime undertakings, it owed its success to the cooperative efforts of many heads and hands Heading up the work for NDRC was Dr C N Hickman, a physicist whose services were donated to the government by the Bell Telephone Laboratories He reported to F L Hovde, in Washington, who had charge of all OSRD research on rockets Dr B D Van Evera, head of the chemistry department at the George Washington University, represented that institution as contracting organization Dr R E Gibson, a physical chemist on leave from the Geophysical Laboratory of the Carnegie Institution of Washington, directed research at the laboratory.

Science News Letter, April 6, 1946

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MEDICINE

New Anesthetic Related to Ether, But More Powerful

➤ A NEW anesthetic related to ether but more powerful, less irritating and with less disagreeable after-effects has been developed by Dr John C Krantz, Jr, of the University of Maryland School of Medicine

Metopryl is the name of the new anesthetic which, chemically, is n-propyl methyl ether Surgeons who have tried it report that it gives greater muscular relaxation and is good for long operations It is said to have a pleasant odor

Science News Letter, April 6, 1946

CHEMISTRY

Synthesizing Penicillin

Removing molecule of water stands between success and failure. Dr. Woodward predicts it will be done on a practical scale.

➤ A MOLECULE of water stands between success and failure to synthesize penicillin, Dr R B Woodward of Harvard University told members of the American Association for the Advancement of Science

Dr Woodward is one of two young chemists who in 1944 performed the difficult feat of synthesizing quinine

Penicillin, he declared, has not yet been synthesized except in micro amounts which can be detected by their effect on disease germs but are not yet available in the form of pure crystals As an organic chemist, he believes that penicillin can be synthesized on a practical scale

The trick seems to involve removing that molecule of water from another chemical, penicilloic acid This acid is penicillin plus one molecule of water When chemists got as far as penicilloic acid in their attempts to produce penicillin in the laboratory during the war, mold production of the drug was far behind the need for it They thought then the problem was solved, because penicilloic acid can be synthesized easily by about a dozen different methods, a number of which are commercially practical

Removing the molecule of water to produce penicillin seemed easy But for two years it has stumped leading chemists in forty laboratories in this country and England

The chemical structure of penicillin is known It is a beta lactam At first chemists rejected this structure for penicillin because beta lactams are very solid compounds whereas penicillin breaks down easily into a number of different chemicals X-ray pictures of beta lactams, however, showed an unsuspected weakness in their structure It might be called a bent or twisted molecule with its two parts on different planes, and at the bend or twist, one part can easily break off to form all the compounds which penicillin becomes under various chemical treatments

One of the parts that breaks off when penicillin is given these chemical treatments is penicillamine This is the part of penicillin that is effective in stopping disease germs The rest of the compound is like the hilt of a dagger, useful for getting the killing edge to the scene of action

Penicillamine stops germs by competing with either valine or cysteine according to present theories These are amino acids needed by disease germs for food Penicillamine from penicillin therefore may kill the germs by starving them through depriving them of necessary nourishment

Even with fairly plentiful supplies of penicillin available from mold production, a synthetic product would have the advantage of being pure penicillin The commercial penicillin now on the market may contain as many as four different penicillins, some of which are more effective remedies than others Artificial production of one or another of these penicillins in pure form is now being attempted by forced feeding of the mold This involves adding to its nourishment certain chemicals which will force or enable it to produce penicillin G or X or one of the other two varieties

Science News Letter, April 6, 1946

ENGINEERING

Improved Methods for Extracting Cottonseed Oil

➤ NEW AND IMPROVED methods that extract more oil from cottonseed at less cost were revealed at the spring meeting of the American Society of Mechanical Engineers in Chattanooga, Tenn N Hunt Moore, Delta Products Co, Wilson, Ark, said that replacing hydraulic presses now used with a solvent process should enable commercial plants to reduce the residual oil in cottonseed meal from between 5 5% and 6 25% to between 1% and 1 50%

This saving would mean an increase of about 45 pounds of oil from each ton of seed processed, he pointed out In addition, Mr Wilson said that the saving in labor from the solvent extraction would lower the cost of producing cottonseed oil

Arnold Glass, Arthur H Morgan and W H Baskervill of the University of Tennessee Engineering Experiment Station staff, reported the commercial development of a pressure cooker for cottonseed that increases the oil yield

They announced studies showing that increases in pressure would reduce the cooking time for the seed to obtain a maximum amount of oil, and said that aging flaked cottonseed meats for 30 days before cooking would increase oil content from 4% to 5%

Science News Letter, April 6, 1946

CHEMISTRY

Napalm Will Be Made Into G-I Liquid Soap

➤ NAPALM, that spelled death and destruction as an incendiary ingredient in wartime flame-throwers, will soon be used by the Army as a G-I liquid soap

Within a few months, the War Department states, 50,000 gallons of a new quick-suds soap made of napalm will be available for everything from scrubbing barracks floors to G-I shampoos

The new soap can be made by plants that turned out the flame-thrower material without any additional equipment and by using little more labor, it was reported

Napalm is also reported to have a limited use in some hospital applications

Science News Letter, April 6, 1946

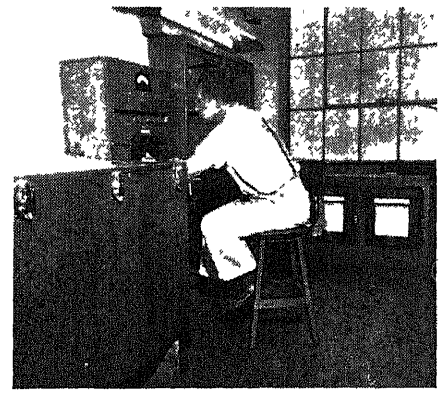


Photo courtesy Oak Mfg Co

TESTING INSTRUMENTS IN ARTIFICIAL CLIMATE

The "climate" (temperature and humidity) in the big chest at left above is regulated by the two Micromax Controllers, on wall beneath window Chest contains electrical insulation, and engineer is using L&N Insulation-Resistance Test Set to help show how it will stand up under actual weather conditions

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Do You Know?

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American *butter* production in 1945 was roughly 67% of that in 1941.

Tantalum oxide is being used successfully in the treatment of wounds and burns, an industrial physician reports

Here is another tip for the cook Vitamin losses during cooking are greater in leafy than in root vegetables

Birds are often found with twigs and bark embedded in their bodies, accidentally acquired in flying against a bush or tree

Aluminum *coal chutes* are now coming more widely into use because they are safe from the sulfur in the coal, sulfur does not eat aluminum.

Some *birds* prefer animal meat, other than insects, for food, others eat only vegetable food, and still others live principally on the eggs or young of insects which they get from under the bark of trunks or limbs of trees

Dusting a *sugar beet* seed crop with DDT mixtures in Oregon eliminated destructive Lygus bugs so thoroughly that it was impossible to find any, where previously the average population was 19 bugs per scoop of an insect net

YOUR HAIR and Its Care

By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

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ASTRONOMY

Sunspot Cycles 22 Years

That the apparent 11-year cycle is only a half-cycle was discovered from a study of the magnetic polarity at the times of sunspot minima.

➤ SUNSPOT CYCLES are 22 years long, not 11 as previously supposed, Dr. Seth B Nicholson of Mt Wilson Observatory stated in an address before the American Association for the Advancement of Science Dr Nicholson spoke as retiring chairman of the Association's section on astronomy

That the apparent 11-year cycle is only a half-cycle was discovered from a study of the magnetic polarity of the sunspot groups at the times of sunspot minima The polarity of the groups at the end of any given 11-year period is exactly the reverse of what it was at the preceding minimum, and of what it will be at the next one

Practically all sunspot activity takes place at solar latitudes roughly corresponding to the tropics on earth. At the beginning of a cycle, the spot groups appear along lines approximately 35 degrees north and south of the solar equator They gradually move closer together, reaching solar latitudes of about 14 degrees as the spots become most numerous, and coming to within 7 or 8 degrees of the sun's equator as the cycle ends Then spots of the new cycle appear again at the 35-degree latitudes

Astronomers and earth-scientists alike are still far from complete knowledge regarding the significance of sunspot cycles in terrestrial affairs, Dr Nicholson told his audience

He said, in part "Of the many correlations with solar activity which have been investigated, those related to the state of the ionosphere, to the frequency of auroras, and to changes in geomagnetism are by far the best established

"Correlations with the weather were attempted as early as 1801 by Sir William Herschel before the periodic nature of sunspots had been recognized The available weather records were so poor that Herschel used the price of wheat as an index of the weather instead of the recorded temperature and rainfall

"That important relations between solar and terrestrial phenomena still remain to be discovered can hardly be questioned but when one considers the complex nature of the earth's atmosphere, it is not surprising that many attempts have failed Correlations derived entirely by statistics need long records to be sure of their reality and scientific progress in this field is therefore slow"

Not Bombardment Weapons

Solar prominences, those enormous flame-like jets that spurt out from the sun's face, are not responsible for the bombardment of the earth with atomic beams, as has often been asserted Evidence to this effect was presented by Dr Robert McMath, director of the McMath-Hulbert Observatory

Using two spectrographic instruments simultaneously, he and his associates were able to obtain a much more accurate measurement of the velocity of the streams of atoms that go out into these prominences than heretofore.

These streams move at speeds of about 12 miles a second—which is very slow motion for events on the sun. It is far below the velocity needed for escape from the sun's gravitational field, which is 387 miles a second Only rarely have atomic streams of that velocity been observed, Dr. McMath stated.

Clouds of matter have been observed floating high above the sun's surface, the speaker continued. Since they cannot escape the pull of the sun's enormous gravity, some other force must be active in holding them up The pressure of the sun's intense radiation is apparently at least part of the answer, but, Dr. McMath concluded, "much more observation and analysis are required before it becomes certain just what forces are acting and how they combine to produce the prominences on the sun"

Science News Letter, April 6, 1946

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WYOMING

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ECOLOGY

NATURE RAMBLINGS

by Frank Thone



Making May Flowers

➤ APRIL SHOWERS, the old jingle tells us, bring forth May flowers

That is true enough, warmth and moisture through a period of three or four weeks are necessary to arouse the dormant plants and stimulate them to shoot up their flower stalks But no one should mis-read the rime as meaning that May flowers are made in April. May flowers are not made by April showers, but by January snows, and by rains that fell last September and even last June

Practically all of the flowering herbs that make a springtime woodland stroll such a delight are perennials. That means that the greater part of their growth was accomplished during the preceding season or seasons, and that the flowers you see now were pre-formed months ago and tucked away in snugly closed buds, usually under ground or right at the surface, where dead leaves and a blanket of snow can protect them at least slightly against the winter cold and (even more important) against drying out

The flowers in these winter buds are recognizable as flowers, even in their embryonic state By careful dissection, you can pry one open and recognize sepals, petals, stamens and pistil Sections examined under the microscope show that they are made up of tissue still in the stage for most active growth, with cells very numerous and very small This makes possible exceedingly rapid expansion when growing-time comes the cells continue to divide, but they also swell up to full size and develop the thicker walls that betoken maturity Johnny-jump-up almost literally jumps up, and so do all his bright little brothers and sisters

One peculiar thing about most spring flowers is that to bring them forth they need not only the traditional April showers but December frost There is something in the physiology of dormant buds, in a majority of spring-flowering plants, that makes a really severe chilling necessary before they will start to grow This requirement for cold to break dormancy does not exist in warm-region plants, though even in the tropics some plants do go through dormant periods In the cool-temperate and arctic regions, however, it is an excellent arrangement, else all plants might do what some foolish species regularly do—break into bloom during the false spring of a warm autumn, only to have their flowers nipped to naught by a sudden cold night

Science News Letter, April 6, 1946

CHEMISTRY

RDX In Itself Is Not A Secret Explosive

➤ RDX, THE SECRET of whose production the Canadian Communist M P, Fred Rose, and the McGill University faculty member, Dr Raymond Boyer, are alleged to have delivered into the hands of Soviet agents, is itself not at all a secret explosive

It was a secret once—a German secret For it was in Germany that this super-explosive was discovered, during the first World War It is one of the innumerable things that chemistry has conjured out of the coal-tar pot Chemically it is cyclo-trimethylene-trinitramine The Germans, however, were unable to find a way to produce it cheaply in quantity, so it did not achieve military importance at the time

Between wars, Canadian chemists succeeded in developing a method for cheap mass production of RDX, and subsequently American chemists found an even better and cheaper procedure, so it began to figure increasingly in World War II explosive mixtures RDX is far more violent than TNT, but is so unstable that it is unsuitable for use by itself It is therefore ordinarily mixed with TNT to keep it from deteriorating

Science News Letter, April 6, 1946

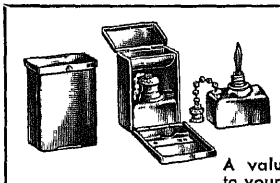
CHEMISTRY

Low-Cost Method Digests Oil Out of Fish Livers

➤ A SIMPLE, low-cost method for getting vitamin-rich oil out of cod, shark and other fish livers is the subject of patent 2,395,790, obtained by Ivan A Parfentjev of Nanuet, N Y Instead of the elaborate and costly machinery for extracting the oil from the liver tissues by pressure and heating, Mr. Parfentjev literally digests it out He puts the livers through an ordinary grinding machine, then acidifies lightly, adds a little pepsin, and lets the material stand until this enzyme has broken down the confining cell walls by the same kind of process that occurs in a man's stomach after he has eaten meat In a few days the yellow oil rises to the surface and can be removed The inventor points out that this method can be used to extract fish oils in the tropics and in other remote parts of the world, where transportation costs at present prevent the taking and shipping of whole fish livers

Science News Letter, April 6, 1946

The usefulness of *radar* ends at the surface of the sea because radio waves travel very poorly in water



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BIBLIOGRAPHY ON THE PETROLEUM INDUSTRY—E DeGolyer and Harold Vance—*Texas Engineering Experiment Station*, 730 p, illus, $2 References arranged under some 900 different subjects

THE DIFFUSION OF ELECTROLYTES AND MACROMOLECULES IN SOLUTION—L G Longsworth, Charles O Beckmann, Margaret Bender, Edward Bevilacqua, Ellen Bevilacqua, Douglas French, A R Gordon, Herbert Harned, Lars Onsager, Jerome Rosenberg, and J W Williams—*N Y Acad. of Sciences*, 136 p, tables and illus, $2 Annals of the New York Academy of Sciences, Vol XLVI, Art 5

ECONOMIC DEMOGRAPHY OF EASTERN AND SOUTHERN EUROPE—Wilbert E Moore—*Columbia Univ Press*, 299 p, maps and tables, $3 A study of the population and economic structure of the predominantly agrarian states of Europe, presenting a comprehensive picture of their critical position in the continental economy

THE GOGLI APPARATUS—AN INTERPRETATION OF ITS STRUCTURE AND SIGNIFICANCE—Leonard G Worley—*N Y Acad Sciences*, 55 p, diagrs and illus, 75 cents. Annals of the New York Academy of Sciences, Vol. XLVII, Art 1

HOW TO KEEP A SOUND MIND—John J B Morgan—*Macmillan*, 404 p, $2 75, Rev ed of KEEPING A SOUND MIND A textbook in mental hygiene for college courses, based on the theory that it is just as easy to form habits beneficial to mental health as it is to fall victim to detrimental habits The author was professor of psychology at Northwestern University

MANIFESTO FOR THE ATOMIC AGE—Virgil Jordan—*Rutgers Univ Press*, 70 p, $1.50 A discussion of the dilemmas—political, sociological, economic, and ethical—which confront modern man

MEDICINE IN INDUSTRY—Bernhard J Stern—*Commonwealth Fund*, 223 p, tables, $1.50 The legislative, social, and scientific backgrounds of industrial medicine, and plans for a future advance toward adequate medical care for the worker.

A NATURALIST'S SCRAPBOOK—Thomas Barbour—*Harvard Univ Press*, 219 p, illus, $3 A series of sketches by the late Dr Barbour of Harvard, containing interesting sidelights on Louis and Alexander Agassiz and other curators of the Harvard Museum, and of the author's extensvie travels

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REPAIR-SHOP DIAGRAMS AND CONNECTING TABLES FOR LAP-WOUND INDUCTION MOTORS Practical Step-by-Step Information and Instructions for Connecting all Types of Windings for Two-phase and Three-phase Motors of 2 to 24 Poles—Daniel H Braymer and A C Roe—*McGraw*, 404 p, tables and diagrs, $3 50, 2nd ed

SCIENCE IN A CHANGING WORLD—Emmett J Cable, Robert W Getchell, William H Kadesch—*Prentice Hall*, 637 p., tables and illus, $5, rev ed. The basic facts about chemistry, geology, physics, climatology and astronomy described in terms of our everyday life. This revised edition contains fresh material on atomic fission, radar, the electron microscope, etc

SUMMARY OF THE PROCEEDINGS 1946 National Conference of the Professions, the Sciences, the Arts, the White Collar Fields—*Nat'l Council of Scientific, Professional, Art and White Collar Organizations*, 27 p, illus, 15 cents

SURFACE ACTIVE AGENTS—M L Anson, R R Ackley, Earl Fischer, David Gans, M H Hassialis, Rollin Hotchkiss, Donald Price, A W Ralston, Leo Shedlovsky, E I Valko—*N. Y Acad of Sciences*, 193 p, diagrs and tables, $2 25 Annals of the New York Academy of Sciences, Vol XLVI, Art 6

THEORY AND PRACTICE IN HISTORICAL STUDY A Report of the Committee on Historiography—*Social Science Research Council*, 177 p, $1 75 A manual designed to help clarify thought about history and to aid historians in teaching and writing it

WHAT SHALL WE DO ABOUT IMMIGRATION—Maurice R Davie—*Public Affairs Committee*, 32 p, tables, 10 cents The facts about immigration to the U S and our immigration laws, and proposals for liberalizing, without fundamentally changing our present immigration policy

WORLD POLITICS FACES ECONOMICS With Special Reference to the Future Relations of the United States and Russia—Harold D Lasswell—*McGraw-Hill*, 106 p, $1 25 The interrelation between the economic policy and the security position of the United States.

THE WORLD WITHIN THE ATOM—L W Chubb—*Westinghouse Electric Corp*, 31 p, tables and illus, free How scientists explored the atom and learned to release its energy A Westinghouse Little Science Series Booklet

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PHYSICS

Civilian Control Demanded

Navy chief of research is against military control of further research on nuclear fission and its possible uses, with inevitable over-emphasis on "security."

➤ "THE NAVY believes that the entire control of atomic energy should be placed completely in civilian hands"

With this repetition of the opinion of his chief, Secretary of the Navy Forrestal, Rear Adm H G Bowen, chief of the Office of Research and Development, set himself squarely against military control of further research on nuclear fission and its possible uses, with its inevitable over-emphasis on "security"

"We can have so much security that progress will be completely stopped or slowed to our great disadvantage," Adm Bowen declared

"Where there is need for advice and consultation with the military," he continued, "the Secretaries of War and the Navy can call upon officers of the Army and the Navy The function of the military, however, should be strictly limited to the consultative and the advisory

"Speaking not for the Navy now, but for myself as a private citizen of the United States, I am particularly apprehensive of any aspect of military control over atomic energy when I view that possibility in conjunction with the proposal to merge all the military, naval and air services in a single department, and under a single Chief of Staff I believe that of itself the proposed merger plans to put so much authority in the hands of one individual that it might extend itself into the field of atomic energy and scientific research in general Then indeed this nation could well be translated from a republic to military dictatorship

"I believe, still speaking as an individual citizen, that there is more than a threat in the proposed merger legislation to place all scientific research under the thumb of a single, professional, military chief Perhaps you will choose to wait until the legislation is reported to Congress to determine whether there is a foundation for my fear But I am sure that you will concur in my belief that if control of atomic research and development is placed under military influence, and that if all military authority is lodged in a single, all-services Chief of Staff, then we will indeed have, as I have said, 'so much security that progress will be completely stopped'"

One of the reasons why Adm Bowen wants to see unhampered research on atomic energy go ahead as rapidly as possible is his hope of eventually seeing it used as a controlled means of power and not solely as a weapon worthy of the Apocalypse He would like to see ships, merchant ships as well as warships, propelled by small atomic power-plants weighing only hundreds of tons, instead of the thousands of tons now tied up in boilers, turbines and huge tanks of oil. The space and weight saved could be utilized for cargo in merchant ships, for better protection in war craft Perhaps the battleship's answer to the atomic bomb is the use of atomic power to make herself invulnerable

Outside the field of nuclear physics, Adm Bowen wants to see vigorous Naval research on such things as guided missiles which, he said, "are ushering in a new artillery era" Until atomic-energy propulsion becomes practicable, he hopes to see wider application of the simple, rugged gas turbine, which he believes may mean more to our economy than jet propulsion Radio, radar and other applications of electronics are another direction for research to take

One possible super-long-range weapon which the speaker believes to be possible is a two-stage rocket, that is, a big rocket carrying a smaller one, which is launched as the carrier-rocket's fuel becomes exhausted The Germans, he stated, had a weapon which they called the A-10, which was designed to cross the Atlantic, and arrive on this side with a one-ton payload of high explosive Substituting an atomic bomb for the relatively feeble TNT, this would be a most terrible weapon, and one practically impossible to intercept and destroy

Science News Letter, April 6, 1946

Waterfowl sometimes mistake wet asphalt roads or pools of oil for water and make landings with disastrous results

Truck tires made from selected varieties of cotton gave 300% more mileage in recent tests than those made from regular commercial cotton

The *water hyacinth,* that clogs Southern rivers and lakes and makes navigation difficult, was an apparently harmless ornamental plant when it was brought from Venezuela about 60 years ago

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⚙ *STORAGE vessel for liquefied natural gas, or other liquids at extremely low temperatures, is spherical in shape with an outer sheet metal shell, an insulating material within, and inside that a gas-tight thin membrane of metal alloy that can withstand 260 degrees below zero, Fahrenheit This membrane is corrugated*

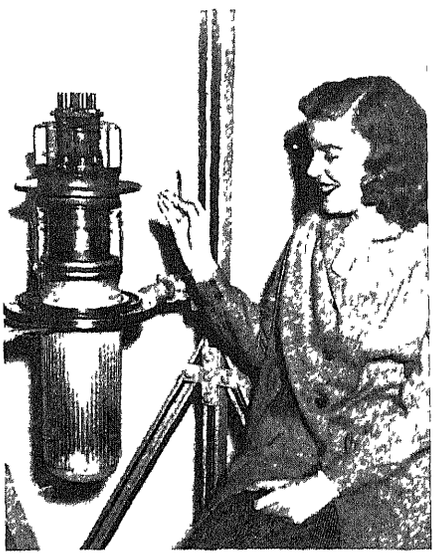
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⚙ *ECHO SOUNDER, an aid to navigation in treacherous waters, has a rapidly oscillating quartz crystal that sends a high frequency signal to the bottom of the water and receives the returning reflected signal The device automatically translates the elapsed time into depth.*

Science News Letter, April 6, 1946

⚙ *TOOL STEEL, recently developed and tested, is claimed to provide a satisfactory combination of hardness and toughness It is airhardened, provides good hardness in heavy sections, and keeps dimensional changes in heat treatment to a minimum*

Science News Letter, April 6, 1946



⚙ *ELECTRONIC TUBES, the most powerful ever built and the smallest ever made, are shown in the picture side by side for comparison The 200-kilowatt giant weighs 80 pounds and is used in government transmitters for beamed overseas broadcasts The midget is a hearing-aid tube, 07 ounce in weight*

Science News Letter, April 6, 1946

⚙ *SCREW DRIVER has a connection between the handle and the shaft that permits the handle to turn farther than the shaft after a predetermined amount of force has been applied Its use prevents stripping the threads of a hard-to-start screw by applying an excessive force*

Science News Letter, April 6, 1946

⚙ *POWER TOOL for home workshops is a combination affair that can be used for grinding, sanding, polishing, buffing and sawing The basic machine, by replacement of parts, performs the first four operations For sawing, the sandwheel is replaced by a circular saw, and a saw table mounted over it*

Science News Letter, April 6, 1946

⚙ *WINDING TOOL for fishermen, size of a nail clip, enables them to make a perfectly wrapped joint of the steel wire leader with the fish hook The leader wire is stuck through the eye of the hook and turned back on itself. Free end and wire are grasped by the tool and wrapped together by rotating the device.*

Science News Letter, April 6, 1946

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Question Box

ASTRONOMY

What has made possible expanded knowledge of the milky way? p 210.

CHEMISTRY

How may DDT be outmoded? p 216

How may the nation's supply of penicillin be doubled? p. 217.

What four new elements have been synthesized? p. 211

What one thing is standing in the way of synthesizing penicillin? p 219.

What alternative program for atomic energy does the State Department report recommend? p 213

What is the one vital element for constructing an atomic bomb? p 213

Why are carrots losing rank as a source of vitamin A? p 216

GENERAL SCIENCE

How can scientists best contribute to a peaceful world? p. 210

How does the State Department feel atomic energy should be controlled? p. 214

What are the "blind spots of science"? p. 215

GEOLOGY

How do we know that shellfish made pearls a million years ago? p 216

ORDNANCE

What new weapons have just been disclosed? p 218

PHYSICS

What is the best guess as to how plutonium is "denatured"? p. 212

PLANT PATHOLOGY

How does spinach juice check plant disease viruses? p 217

Where published sources are used they are cited

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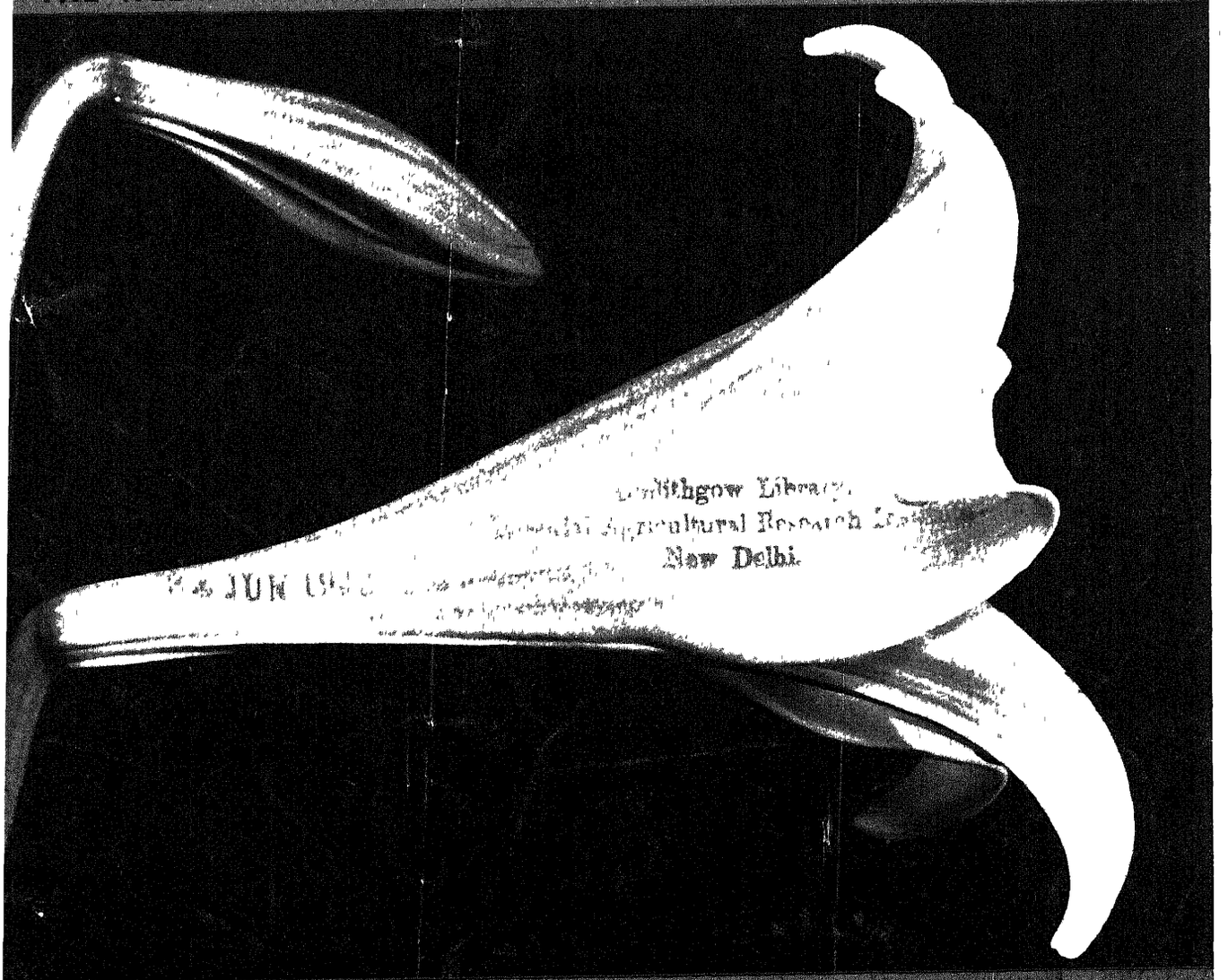
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SCIENCE NEWS LETTER

Vol. 49, No. 15

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 13, 1946



Bigger and Better

See Page 230

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946



Transportation pioneer

The two dominating spheres of achievement of George Westinghouse were *transportation* and *alternating current*

His first major contribution to transportation was the famous Westinghouse air brake — followed, a few years later, by his development of automatic block-signaling systems for railroads

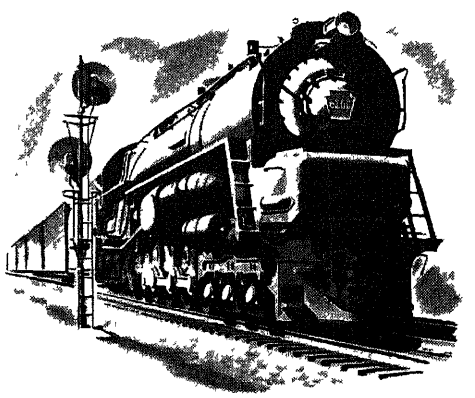
Later, this great inventor-engineer pioneered a single-reduction-gear direct current motor which caused sweeping changes in the operation of street railways.

But a unique achievement in the life of George Westinghouse came in 1905 — when he brought *transportation* and *alternating current* together in a single, masterful triumph of engineering

For, on May 16, 1905, he successfully demonstrated the first *single-phase main-line* electric locomotive before the delegates to the International Railway Congress, at his plant in East Pittsburgh, Pa

Shortly afterwards, in 1907, Westinghouse electrified the *first main-line railroad* — the New York, New Haven & Hartford, between Woodlawn, New York, and Stamford, Connecticut

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PHYSICS-ENGINEERING

Future Atomic Jobs

The manufacture of special isotopes for future technical developments will be the main use of atomic power plants, Prof. W. G. Pollard declares.

➤ JOBS FOR FUTURE atomic power plants and the conditions for operation of such units were forecast by Prof W G Pollard of Tennessee University's Department of Physics for members of the American Society of Mechanical Engineers meeting in Chattanooga, Tenn

In addition to atomic energy as a source of power, comparable to any other fuel, the unique products of fission reactions will be a reason for operation of such installations, according to Prof. Pollard Plants for the production of various isotopes will be required

"The isotope is as important in a nuclear reaction," says the Tennessee physicist, "as the molecule is in a chemical reaction A variety of special isotopes will be required for future technical developments and these will require special plants for their production

"Such plants require unit operations unfamiliar to present engineering practice They may be based on thermal diffusion columns, gas diffusion through barriers, mass selection of ions in a magnetic field, ultracentrifuges, or special chemical exchange reactions The engineering of such plants may be expected to be an important new field for oncoming engineers"

In regard to the future of atomic energy, Prof Pollard discusses two sorts of nuclear reactions In the first sort both reacting nuclei contain one or more protons In the second neutrons take part The first kind of reaction would take place if we could bring together atoms of some of the light elements closely enough to allow their nuclear forces to act

Hydrogen would react with lithium, under these circumstances, and give out energy of the order of 30 million kilowatt hours per pound of lithium burned, or nitrogen could be reacted with heavy hydrogen to release eleven and a half million kilowatt hours per pound of nitrogen Neglecting considerations of thermal efficiency, any of these reactions could be used to operate a 50,000 kilowatt power plant on a continuous basis with a fuel consumption of about a pound per week.

"Not only is this perfectly possible," goes on Prof Pollard, "but a vast number of power plants of this type are at present in continuous operation throughout the universe These are the familiar stars, including our own sun."

Enormous central temperatures and enormous pressures in the stars hold together these light nuclei so that the reactions which we observe can take place Such temperatures and pressures are impossible on earth In the other sort of reaction, resulting from action of neutrons, which has been made to work here on earth for production of the atomic bomb, the difficulty is that neutrons do not exist as such in nature

"With the exception of a negligible number in cosmic rays," says Prof. Pollard, "they are all to be found captured in atomic nuclei from which they can be removed only with the expenditure of considerable energy Thus we are faced with a difficult dilemma Materials for the first class of reactions are abundant but the conditions to make them go are prohibitive For the second class the conditions of operation are ideal for a practical atomic power plant, but the essential material for them is non-existent as a natural substance"

"The one reaction capable of maintaining a sustained source of neutrons," says Prof Pollard, "is the fission reaction In a light nucleus the repulsion between the protons due to their electric charge, although very strong by molecular standards, is yet only a negligible part of the intense nuclear forces binding the particles together

"In a heavy nucleus near the top of the periodic table there are, however, so many protons that their repulsion becomes comparable to the nuclear cohesive force. As a result a relatively small disturbance of the nucleus can upset the equilibrium so that the nucleus divides into two pieces which are quickly pushed beyond the range of the nuclear forces

"Under the great force of repulsion between the large positive charge on each, the two fragments then fly apart with enormous kinetic energies The heat generated in slowing down and stopping them is the major source of energy in a uranium power plant"

Science News Letter, April 13, 1946



RESISTS ACIDS—From a boiling bath of hot sulfuric acid, a laboratory technician lifts two rods of plastic. One has charred and deteriorated. The other, made of Du Pont's new "Teflon" tetrafluoroethylene resin, is not affected at all by the highly corrosive acid. "Teflon" is not attacked even by aqua regia, which dissolves gold and platinum.

SEISMOLOGY

Tidal Wave Caused by Quake off Unimak Island

➤ THE SUBMARINE earthquake that set the destructive tidal wave in motion across the Pacific on Monday, April 1, had its epicenter about 70 miles south of Unimak island, which is the first and largest of the Aleutians, just off the tip of the Alaskan peninsula Seismologists of the U S Coast and Geodetic Survey, who made the determination after studying data wired and radioed to Science Service from seven observatories, gave the geographical coordinates of the spot as latitude 53 5 degrees north, longitude 164 degrees west.

There were three main shocks, all severe. The first and strongest recorded its time of initiation on the instruments as 7 28 8 a m , EST, which is the equivalent of 1·58.8 on Unimak island—which happens also to be Hawaiian time The second shock came five hours later, and the third followed 11 hours after the second

The sea bottom has a very curious formation at the point where the earthquake occurred, the Coast and Geodetic

Survey scientists said It is about 100 fathoms (600 feet) deep there, but begins to slope downward very steeply, reaching a depth of 1,000 fathoms (6,000 feet) within 15 or 20 miles Earthquakes have been frequent in this general region, but nothing of major importance has been recorded from this particular locality

The shock was undoubtedly a "world-shaker," for the instruments in the seismological observatory at far-off Wellington, New Zealand, recorded it Other stations reporting were the Dominion Observatory at Ottawa, Canada, the observatories of the Jesuit Seismological Association at Georgetown University and Weston College in Massachusetts, and the stations of the U S Coast and Geodetic Survey at College and Sitka, Alaska, and Tucson, Ariz

Science News Letter, April 13, 1946

ENGINEERING

Atomic Heat Problem

Thousands of millions of degrees Fahrenheit temperature are reached by individual atoms, but resulting fluid can be handled by already familiar processes.

➤ ENGINEERS faced with new problems in the utilization of heat from atomic power plants will at least have as a starting point the familiar conditions of heat exchange, it appears from a paper given before the American Society of Mechanical Engineers, by Prof W G Pollard of the department of physics of the University of Tennessee.

Thousands of millions of degrees Fahrenheit temperature are reached by the individual atoms of fission products in an operating atomic pile But after these have been brought into equilibrium with the coolant, the resulting fluid, heated in the process, can be handled in boilers designed for steam or mercury vapor in processes already familiar

The problem of bringing the intensely hot particles into equilibrium with the coolant is not unlike mixing one's bath water The user of atomic energy can, within practical limits, choose the temperature of the resulting mixture, for the fission fragments are at so high a temperature that any man-made temperature will still be cool by comparison

This intense heating results from collision of atomic particles The fission fragments are stopped, for the most part, in the metal rod where they are produced This results, says Prof Pollard, in an intense heating of the rod, so that arrangements must be made for efficient heat transfer from the rods to the coolant, which is air, water or molten bismuth flowing through the pile where fission is carried on

"It is possible," says Prof Pollard, "to heat the coolant to any desired temperature because the fission fragments are liberated in the metal at a temperature of many million degrees Fahrenheit The hot coolant will be radioactive on leaving the pile but it can be passed through a boiler or heat exchanger to produce steam or mercury vapor at high pressure and then returned to the pile "

Another important aspect of pile design and operation outlined by Prof Pollard involves protection against radioactivity Throughout the body of the rods of fissionable material in a going pile small amounts of elements like barium, krypton, iodine, yttrium, etc., are being generated After coming to thermal equilibrium and collecting some electrons to complete their transmutations, these new elements undergo a whole series of radioactive disintegrations, like radium, before reaching stable forms Gamma rays given off in this process must be absorbed by the thick screens which must always surround the pile, and this absorption again creates heat and the necessity for cooling

"The fast fission neutrons," says Prof Pollard, "are produced at a steady rate in the metal at a temperature of some 10,000,000,000 degrees Fahrenheit. They represent a very dilute but very hot gas which diffuses out into the moderator where it is cooled down by mixing to the temperature of the moderator. As a cool gas it diffuses back into the metal where it can produce more fissions This represents a true convective heat transfer " The problems of nuclear reactions, the energies involved and the problems of handling radiations are well known in physics, says Prof Pollard, but have not been generally included in engineering training.

Science News Letter, April 13, 1946

Crab grass, the lawn pest, is an annual and prolific seeder, one plant may produce as many as 300,000 seeds

HORTICULTURE

Garden Favorites Include Tomatoes, Beans

➤ IF YOU HAVE a garden, you will probably plant several of the following, depending upon the size of the plot you plan to cultivate tomatoes, string or wax beans, onions, lettuce, radishes, beets and carrots Each of these seven vegetables were grown in more than half of the 1945 Victory Gardens, a survey conducted by the Bureau of Agricultural Economics shows.

Science News Letter, April 13, 1946

American *eels* are confined to the Atlantic and Gulf coasts and streams

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BACTERIOLOGY

Germ-Free Animals

Have been reared through the third generation in sterilized closed cylinders. Will be valuable for dietary and medical researches.

➤ GERM-FREE animals, that have never had a bacterium in their bodies, have been reared in the laboratories of bacteriology at the University of Notre Dame, and carried through to the third generation This difficult feat, with results important for biological research, was accomplished by Prof James A Reyniers of the Notre Dame faculty

Normally, all animals (including man) are germ-free until they are born, but then immediately pick up a full set of germs with their first food and their first breaths By bringing young rats and other animals to birth by caesarian operation inside a completely sterilized cylinder, feeding them sterilized food and admitting only filtered air, Prof Reyniers was able some years ago to produce and rear germ-free animals

These lived perfectly normal lives in their isolation from our germ-swarming world, but they would not breed Prof Reyniers suspected that something was lacking in their diet, but for a long time he was not able to overcome the difficulty. Lately, however, he found the correct diet, and his germ-free rats began to breed as rapidly as normal rats do By the time the third generation had been born, the germ-free cylinder in which the animals lived was getting pretty crowded, and he needed it for some other work anyway However, by this time he had proved his point, so he took the rats out and ended the experiment

The second- and third-generation germ-free rats, Prof Reyniers said, were exceptionally sleek and healthy Their muscles and other tissues, on microscopic examination, "looked just like the idealized drawings you find in anatomy textbooks"

Scientists can make effective use of germ-free animals in dietary, medical and other researches, because when you try a new food combination, or a new medicine, on one of them you will know that what happens is its own reaction, and not the response of an animal conditioned by a lot of germs in its insides

Science News Letter, April 13, 1946

CHEMISTRY-MEDICINE

Key to Streptomycin

It is most effective against germs that grow best in the air; this may be the key to way in which the drug interferes with growth of disease germs.

➤ STREPTOMYCIN, potent germ-killer like penicillin for aid in our war on disease, is most effective against those germs that grow best in air In this fact may lie the key to the way in which this substance from the earth interferes with the growth of disease germs, Dr. Amedeo Bondi, Jr, Dr Catherine C Dietz and Dr Earle H Spaulding of Temple University School of Medicine in Philadelphia, state (*Science*, March 29)

The antibacterial action of streptomycin against such disease germs as staphylococci is significantly better when the jar in which the germs are growing is open than when it is kept airtight, the bacteriologists noticed These same disease germs, however, grow best when there is plenty of oxygen

Duplicate tests with various species of bacteria at a temperature of 99 degrees Fahrenheit were tried with and without air From 2 to 16 times as much streptomycin was found necessary to arrest the growth of bacteria for 24 to 48 hours when air was excluded than when plenty of oxygen was available With one exception these results were observed with organisms which normally had their maximum growth when there was plenty of oxygen

The activity of streptomycin was greatly diminished by such compounds as cysteine, sodium thioglycollate, sodium bisulfite and sodium hydrosulfite. Whether this interference is due to a lowering of oxygen tension or to some specific chemical reaction or both acting simultaneously, will probably be discovered with further research

It is conceivable that in certain parts of the body where organic reducing agents are present or where a low oxygen tension exists, larger concentrations of streptomycin may be necessary to inhibit the growth of bacteria, they point out

The antibacterial action of streptomycin, they suggest, may be due to its ability to block some enzyme system, oxidative in nature This system would seem to be essential only to the growth of susceptible bacteria of the type that grow best in air Bacteria that grow best when air is excluded do not possess this enzyme system and therefore streptomycin is not such an effective weapon against them

Science News Letter, April 13, 1946

CHEMISTRY

2,4-D Promises Usefulness In Stopping Weeds

➤ 2,4-D, THE NEW weed-killing chemical, shows promise of being able to stop obnoxious growths before they even get started, in experiments at the U S Department of Agriculture's great experiment station at Beltsville, near Washington, D C A concentration equivalent to only 1 5 ounces of 2,4-D in the top inch of an acre of soil was found sufficient to prevent or materially retard the sprouting of weed seed of sensitive species, such as wild mustard The ordinary rate of application as a spray on foliage of grown weeds is 1 5 pounds per acre—16 times more than the seed treatment

An important tactical consideration in using 2,4-D in this way, Dr John W Mitchell and Dr P C Marth of the station staff point out, is the loss of weed-killing power by the chemical in moist soil It can therefore be used to kill the weeds in fallow fields in humid regions because it will no longer be there to harm crop plants the following season On the other hand, the compound retains its plant-killing ability for as long as 12 to 18 months in really dry soil.

In other tests at Beltsville, 2,4-D was shown to be a satisfactory means for the control of Japanese honeysuckle, an introduced woody vine that has become a terrible pest along a considerable stretch of the Middle Atlantic seaboard In a 1-to-1000 solution in water, two sprayings, in March and June, made a complete kill of the vine Spraying an acre in this way would cost somewhere around $10 or $12 Further tests are now under way to determine whether the method can be recommended for general use

Science News Letter, April 13,

AVIATION-MEDICINE

Device Pulls Ripcord

Barometer-like instrument does this automatically to make descents from high altitudes safer. Designed by the Army Air Forces' Aero Medical Laboratory.

➤ A BAROMETER-LIKE device that automatically pulls the ripcord on a parachute to make descents from high altitudes safer was described by a group of scientists at the opening session of the Aero Medical Association in Chicago

The instrument was designed by the Army Air Forces' Aero Medical Laboratory at Wright Field and the Friez Instrument Division and was manufactured by the Friez Company. The scientists who worked on the problem of parachute-opening shock and an instrument to overcome it are Maj G A Hallenbeck, now at the Mayo Clinic, Maj G. L Maison, now at Boston University School of Medicine, Capt Kenneth E Penrod, now at Iowa State College, Ralph E Sturm, of the Friez Instrument Division, Bendix Aviation Corporation, and Ernest E Martin, of the Aero Medical Laboratory

When a man jumps with a standard parachute at altitudes of 20,000 to 25,000 feet, he is likely to be injured by the shock or impact when the chute opens, Maj Hallenbeck explained At altitudes above 30,000 feet this impact is almost certain to produce injuries

Experiments in which dummies were dropped from a B-17 at altitudes up to 40,000 feet demonstrated that at the velocities at which a freely falling man would be expected to travel, the impact at parachute opening is greater the higher the altitude of parachute opening Brief impact forces as high as 7,000 pounds were recorded when the standard 24-foot nylon parachute decelerated 200-pound dummies at an altitude of 40,000 feet

One way to avoid the danger of injury from parachute opening shock forces at high altitudes is to have the man fall freely to altitudes below 20,000 feet before opening his parachute Such free fall also lessens the exposure to cold and oxygen lack at high altitudes It is not without danger, however, because unconsciousness from oxygen lack, cold, perhaps even fear, and other unknown factors can cause a man to fail to pull the ripcord

The instrument designed to overcome these dangers and make free falls safe consists of a small powder charge which when electrically fired pushes a piston which pulls the parachute ripcord The electrical circuit is completed by a micro switch controlled by an aneroid capsule, similar to that in many barometers, which is sensitive to changes in the air pressure which surrounds it The position of the aneroid capsule can be set so that its contraction during descent closes the circuit and causes the powder charge to fire at any desired pressure altitude between 500 to 20,000 feet

A safety or arming switch is, of course, necessary to prevent the device from pulling the ripcord during normal airplane descent.

Successful tests in which dummies were dropped from aircraft have shown that the design of this device is sound With such a device a man jumping from an airplane will fall freely until he reaches the altitude at which the parachute opening device is set At this point the parachute ripcord will be pulled automatically The instrument does not interfere with manual pulling of the ripcord

The studies at the Aero Medical Laboratory also showed that silk 28-foot parachutes produce approximately 50% more shock force than do nylon 28-foot parachutes at the same altitudes and air speeds Oddly, inflation of 28-foot nylon parachutes produced slightly less shock force than did 24-foot parachutes at the same altitudes and air speeds.

Science News Letter, April 13, 1946

BOTANY

Easter Lilies Will Be Bigger and Better

See Front Cover

➤ EASTER LILIES are going to be bigger and better—bigger by a hundred per cent, better because they will be solid and last much longer in their beauty Plants have already been raised with flowers fully seven inches across, their trumpet-like throats as much as an even foot deep They stay in bloom much longer, too, partly because the petals are firmer and partly for reasons of internal physiology One of the new lilies is shown on the front cover of this SCIENCE NEWS LETTER

These miracle-lilies are not ready for the market yet, they are still growing in greenhouse benches at the great experiment station of the U S. Department of Agriculture at Beltsville, Md, a short distance outside Washington Magnificent though they are, Dr. Samuel L Emsweller, the scientist who is working on them, feels that they can still be made a little finer before being released into the hands of private growers for general propagation and sale

These lilies are one of the practical results of the half-accidental discovery, some years ago, of the ability of colchicine, an old-fashioned rheumatism remedy, to change the course of evolutionary development in plants by doubling the number of chromosomes, the heredity-bearing bits of living matter in the cell nuclei The new lilies were produced by a doubling-up of these essential cell contents in Easter lilies of the ordinary type

The resulting plants are taller and sturdier-looking, to match the huge blooms they bear The tissue of the petals is solider and thicker, crisp-looking but not brittle. The flowers are strong as well as beautiful

The reason for their longer life lies partly in this strength, partly in the fact that, like many plants with doubled chromosome numbers, they are sterile—incapable of producing seed In ordinary lilies, when the physiological processes leading toward seed formation have been well started, the flower has no further reason for being and the petals begin to collapse In sterile flowers this does not happen; the petals keep their perfect shape and pearly luster a great deal longer

Other flowers are being "doubled and redoubled" in the same way One fine series now in bloom in the Beltsville greenhouses consists of bright-blossomed snapdragons with much taller stalks and much bigger flowers than their parents But one cannot help feeling, as he follows their originator around among the benches, that Dr Emsweller's greatest pride and joy are his giant Easter lilies.

Science News Letter, April 13, 1946

When *hens* fail to get enough calcium in their feed, they draw it from their bones, up to about 25% of their calcium content

Moxa, a nostrum for Oriental ills for generations, was a secret ingredient in the Japanese navy gas mask; the filter in the mask was made of silk, cotton and fibers of the magical weed.

ELECTRONICS

Sonar Defeated Subs

The Navy reveals the story of the battle against undersea raiders. Sonar credited with bringing victory against Nazi U-boats.

➤ SCIENTIFIC superiority that developed sonar for accurately locating submerged enemy submarines was credited with bringing victory against Nazi U-boats in World War II as the Navy revealed the story of the battle against undersea raiders

Sonar, improved during the war by cooperative work in Allied laboratories, was credited for the sinking of a majority of the 996 enemy submarines sent to the bottom during hostilities The Navy said that 70% of the undersea "kills" were made by British ships and 30% by U. S vessels

Termed the only effective method of detecting completely submerged submarines, World War II sonar is a highly developed system for echoing sound waves sent out under the ocean's surface. Submarines were detected by the echoed sound, and the development of echo-ranging permitted ships accurately to locate and track down submerged U-boats

Before Pearl Harbor, American Navy experts were cooperating with British scientists in combining the U S sonar with the best features of British systems From this cooperative venture came the equipment that turned the tide to victory in the Battle of the Atlantic during the spring and summer of 1943

The name sonar is derived from the words sound, navigator and ranging, while the British equivalent, asdic, is a holdover from the initials of the Allied Submarine Devices Investigation Committee in World War I

Installed on ships, sonar includes a retractable projector that is lowered under the keel of a ship to send out sound waves and receive their echoes The projector is covered by a streamlined dome to eliminate water noises that might interfere with sound reception

The driver that produces the sound signals is usually located close to the projector, while the receiver-amplifier and indicating equipment are in a "stack" high up on the ship near the bridge.

Key device in the operation of sonar is the transducer in the projector that sends out and receives the "pings" that tell of the presence of submarines

Asdic used quartz slabs sandwiched between steel disks, while modern sonar's transducer is a series of magneto-striction tubes, three inches long with a diameter of three-eighths of an inch These tubes, made of a nickel alloy, have coils of wire wound around them to form small electro-magnets They elongate or contract with changes in their magnetic flux

Electrical energy from the transmitter moves the tubes, vibrating the diaphragm of the transducer to send out the "pings" When the "pings" are echoed back, they generate an electric current from the tubes that produces a different sound

This sound varies according to the target that causes the echo, so that Navy sonarmen can distinguish between the signal from the ship's propellers and submarines

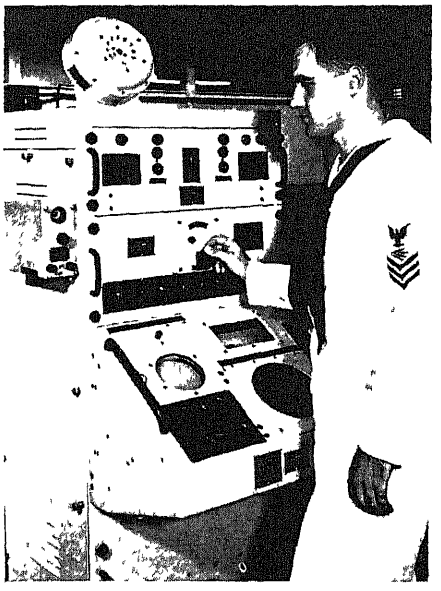
Highly developed direction and range equipment show the distance and bearing of the echoed sound so that submarines could be accurately located for attack

Enemy torpedoes were also detected by the sonar ears of ships and several cases are recorded of ships that were able to dodge approaching undersea attack by means of rapid maneuvers

Underwater sounding devices for navigational use were developed as long ago as 1902, and a crude type of sonar was used in World War I with some success The advances that led to the modern equipment were produced between the wars, but the production of escort vessels and sonar equipment and the training of technicians delayed the anti-submarine campaign

During the war, previous research and military necessity combined to produce the most effective equipment yet developed to combat submarines

Science News Letter, April 13, 1946



DEFEATED SUBS—This is a side view of the sonar control console, test installation, with operator tuning equipment. Controls are grouped in an assembly called the Stack, usually located in or near the pilot-house. Official U. S. Navy photograph.

SEISMOLOGY

Earthquake Detectors Can Also Predict Weather

➤ INSTRUMENTS used to detect earthquakes can be used in predicting the weather. Seismographs, which register the tremors traveling through the earth from far-off earthquakes, also register the much smaller shiverings caused by the pounding of heavy storm waves on the shore These lesser vibrations, called microseisms, also travel through the earth's stony crust, often for long distances.

At the meeting of the American Association for the Advancement of Science, Rev James B Macelwane of St Louis University told how a method was worked out by which the approximate location of a storm center can be located, and its movement traced as it travels off shore It involves the use of data from three separate seismograph stations, the combined records showing the direction from which the microseisms are coming Father Macelwane told how such an experimental setup was able to follow the great hurricane of 1938 as it moved northward off the Atlantic coast

Since the validity of the microseismic method has been established, it is being put to practical use by several cooperating government agencies in locating and tracking hurricane centers in the Caribbean area Lt Comdr. M H Gilmore, formerly a seismologist with the U S Coast and Geodetic Survey, told how three seismological stations, in Florida, Cuba and Puerto Rico, are already "watching the wiggles" for signs of approaching tropical storms.

Science News Letter, April 13, 1946

PUBLIC HEALTH

Smallpox Cases on West Coast Not an Epidemic

➤ THE SCORE of smallpox cases with seven deaths from the disease in Seattle and the additional seven or eight cases in San Francisco, recently, are not enough to constitute an epidemic, authorities at the U S Public Health Service state.

Twice as many cases were reported during an outbreak in Pennsylvania three years ago At that time health authorities warned against panic over the situation Prompt subsidence of the outbreak after vaccination of exposed population groups bore out their opinion that there was no cause for alarm

The occurrence of sporadic cases among troops returning from the Orient is "very disquieting" and cause of considerable unhappiness in the Office of the Surgeon General of the Army The fact that a case or two occurs on a returning troop ship, in spite of the fact that the entire Army has been vaccinated against smallpox, is explained by medical authorities at the War Department as the result of occasional failures that might well be unavoidable in vaccination of eight or 10 million persons

Smallpox is caused by a virus It is very readily spread through the secretions of the nose and throat even before the spots come out on the skin and later through particles from the skin of the patient. The incubation period of the disease is usually between eight and 16 days, so that unprotected persons are not out of danger until at least 16 days following exposure to the disease

Smallpox varies in severity Mild strains of the virus have a fatality rate of only 1% but severe strains may kill as many as 30 out of 100 patients The cases among returning troops and on the West Coast, so far as is known, are not particularly severe

Science News Letter, April 13, 1946

METEOROLOGY

Weather to Be Studied At Extreme Heights

➤ THE U S NAVY is planning to study the weather at extreme heights from 100,000 to 500,000 feet, by means of rockets bearing automatic recording instruments, which have been given the name "rocketsonde" Plans for this project, which will have the cooperation of this country's leading universities, were outlined before meteorologists at the meeting of the American Association for the Advancement of Science by Lt Comdr Daniel F Rex, of the Navy's Office of Research and Invention

Data thus obtained are expected to be of especial value in computing the radically new ballistics tables that will be needed in the use of ultra-long-range rocket weapons They will also probably be useful because of the influence of events in these very high altitudes on the weather down where humanity walks and flies

The things that conventional weather instruments measure—temperature, humidity, pressure—are of little interest in the vacuum-like atmosphere so far above the earth, Comdr Rex said Instead, radar tracking will tell of the deflection of the soaring missile from its calculated line of flight, thus giving an idea of what winds are blowing at altitudes 10 times or more higher than planes have ever flown Instruments borne by the rockets will tell of the intensity of the sun's radiation

The first rocketsondes which will be sent up this summer in connection with the planned tests of V-2 rocket-bombs will have a diameter of 15 inches and an over-all length of 24 feet, and will weigh a little over a ton, fully loaded Of this weight, only 325 pounds will be available for a "pay-load" of instruments

Comdr. Rex also showed films of V-2 launchings, made by American cameramen in Germany, showing captured weapons being sent up by German technicians

Science News Letter, April 13, 1946

CHEMISTRY

Tensile Strength of Cotton Yarn Increased 40%

➤ COTTON YARNS are given additional strength by the application of a new chemical, members of the American Association of Textile Chemists and Colorists were told by Dr Donald H Powers of Monsanto Chemical Company The tensile strength of the yarn may be increased up to 40%, he declared

The improvement is effected through mill applications of a special sub-microscopic colloidal silica called Syton, he said This chemical was developed by the company to make sheer stockings run-resistant and to take the shine off serge When applied to cotton sliver in concentrations of 1% to 3%, the inter-fiber friction is increased and it was possible to increase the tensile strength as stated, and to decrease the twist as much as 40%, Dr Powers explained.

Science News Letter, April 13, 1946

IN SCIENCE

MEDICINE

Delay in Malarial Treatments Not Justified

➤ ALTHOUGH delay in giving quinacrine (atabrine) to people suffering from malaria of the type contracted in the Pacific may cut down the number of times the patient is likely to suffer a relapse, such a drastic measure does not seem to be justified. A person would naturally tend to get well even though prompt treatment is given in the case of acute attacks, Lt Col Harry A Gordon, Col. Alexander Marble, Capt. William W. Engstrom, Capt Henry A Brunsting and Lt. Col. Stuart W. Lippincott of the Army Service Forces, Eighth Service Command, Harmon General Hospital, Longview, Tex., state. (*Science*, March 29.)

Because so many people had relapsed after apparently recovering from vivax malaria of South and Southwest Pacific origin, it has been suggested that perhaps use of the drug interfered with the body's natural tendency to develop immunity To test this suggestion, the physicians tried withholding treatment on volunteers at the Army hospital

A total of 69 soldiers volunteered for the test They were given the disease by American anopheline mosquitoes infected by 10 volunteer soldiers with malaria acquired in the South or Southwest Pacific

The drug quinacrine dihydrochloride was not given the malaria patients until they had had from 8 to 15 paroxysms with an average of approximately 40 hours of fever at a temperature of 104 degrees This was reached on the average in approximately 20 days The doctors kept tabs on the patients until either a relapse occurred or 60 days had passed without relapse

It was found that 45, or 65%, of these patients had a relapse Of the 16 patients observed following quinacrine therapy during the first relapse, 69% had a second relapse This is little better than would have been expected had these patients been given quinacrine promptly The Medical Corps officers therefore believe that delaying the treatment can hardly be considered of practical significance

Science News Letter, April 13, 1946

E FIELDS

MEDICINE

Pernicious Anemia Helped by Thymine

➤ STRIKING anti-anemia properties of a synthetic chemical called thymine were reported by Dr Tom D Spies of the University of Cincinnati at the annual meeting in New York of representatives of foundations and philanthropists aiding in financial support of the university's nutrition studies at Hillman Hospital, Birmingham, Ala

When thymine is given in pernicious anemia, "the patient who had so long been pale, listless and weak then experiences a sudden and dramatic increase in his strength, appetite and vigor," Dr Spies reported "He now sits up in bed and insists he is strong enough to go home and to work"

Red blood cells which have been arrested in their development in the bone marrow of pernicious anemia patients "form huge islands of regeneration and within three or four days after treatment is begun, new cells begin pouring into the blood"

Thymine is not to be confused with thiamin, which is also called vitamin B_1 Thymine is a part of nucleic acid, Dr Spies explained, and gets its name from the fact that it was first isolated from the thymus gland

Good results in pernicious anemia have also been obtained with a vitamin, folic acid, Dr Spies reported While the two chemicals have a similar effect, doses of synthetic thymine must be several thousand times as large as those of synthetic folic acid

Pernicious anemia patients heretofore have been treated with liver, discovered in 1926 to be effective in this ailment, and with liver extract, brewer's yeast and ventriculin

Science News Letter, April 13, 1946

CHEMISTRY-BIOLOGY

Keeping Tissues Alive With Unknowns Criticized

➤ BIOLOGICAL research workers who grow bits of chick heart or other animal tissue in nutrient fluids containing blood serum, meat juice and similar liquids were criticized before an audience of biologists at the meeting of the American Association for the Advancement of Science by Dr Philip R White, of the Research Institute of the Lankenau Hospital, Philadelphia These fluids of animal origin are mixtures whose chemical composition is still very much in the dark, Dr White pointed out, consequently results of experiments conducted with them must inevitably contain unknown factors—they are at best incomplete answers

Dr White won international notice some years ago as the first scientist to make detached pieces of plant tissue grow in a solution of completely known chemical makeup, containing sugar, mineral salts and vitamins He undertook to work up a solution containing no "unknowns" suitable for animal tissue cultures Using sugar, mineral salts, vitamins and amino acids, he succeeded in keeping a culture of chick-embryo heart alive and beating for six weeks He also scored similar partial successes with other animal tissue cultures He regards this work as only the beginning, and hopes eventually to keep animal tissue alive indefinitely in chemically known culture fluids, as he has already done with plant material

Science News Letter, April 13, 1946

ENGINEERING

Amphibious Vehicle Is Neither Car nor Boat

➤ AN AMPHIBIOUS vehicle, that is neither a boat on wheels nor a waterproofed truck but was designed from the ground up for its special job, is covered by U S patents 2,397,791 and 2,397,792, issued to two Detroit inventors, C F Kramer and F G Kerby, assignors to the Ford Motor Company While it was avowedly developed for military purposes, it should be useful to ranchers, foresters, engineers and others who have to traverse wild country where bridges are scarce

The vehicle has a body (or hull) shaped like a square-ended, flat-bottomed boat, with sides recessed for the four wheels The engine compartment, forward, is accessible through a double hatch, forward of this is a smaller hatch that admits air to the radiator during land operation but is shut when the vehicle enters the water Cooling air is then drawn through ducts opening into the cockpit A propeller and rudder make navigation possible

Since the vehicle has some resemblance to the Army's famous "duck", except that it is smaller and more compact, it might well be nicknamed the "duckling"

Science News Letter, April 13, 1946

CHEMISTRY

Lightweight Plastic To Find Many Uses

➤ LIGHTER than cork but stronger and a better insulator is the report of Du Pont chemists on the latest plastic, cellular cellulose acetate or "CCA" for short

Uses as the strong, lightweight cores in airplane floor panels, tail assemblies and wing structures, and in refrigerators, luggage and sections of prefabricated houses are predicted for "CCA"

Uniform in density and capable of being tooled or shaped with woodworking tools, the new plastic may also be used in airplane instrument cases, furniture, lockers for frozen food and as core material for such diverse items as refrigerated truck bodies, boats or light toys, according to the chemists who developed it

Bonded between two panels of metal, wood or another plastic, the new lightweight material will not be compressed except under extreme pressure As an insulator, it has the properties of cork, balsa wood and other rigid insulating materials with less weight

Du Pont chemists say the idea for "CCA" was an accident When a cold slug of cellulose acetate clogged a molding machine, it was heated to help dislodge it The result was the first cellular cellulose acetate

"CCA" is now produced by heating a mixture of cellulose acetate with other materials under pressure It comes out as a mass of pin-point size bubbles that become hard and rigid when chilled

Science News Letter, April 13, 1946

ICHTHYOLOGY

"Elephant Fish" Among Peruvian Species Collected

➤ STRANGEST fish discovered by an expedition from the U S Fish and Wildlife Service in the waters of Peru is one called the elephant fish

The name comes from a long proboscis with a leaf-shaped flexible appendage that hangs over the fish's mouth Ichthyologists say it belongs to the same group as a fish previously found off the coast of South Africa

The Latin name for the unusual sea creature is *Callorynchus callorynchus*, but its unique trunk will probably perpetuate the name elephant fish

More important to scientific knowledge is the discovery of 51 new species of fish by the scientists, who spent nearly a year studying Peruvian marine life

Science News Letter, April 13, 1946

RADIO

Forecasting for Radio

Warnings of approaching storms which will interfere with shortwave broadcasts can now be made in sufficient time to be used in routing important messages.

By MARTHA G. MORROW

➤ MEASURING radio echoes is one of the techniques perfected under war secrecy that allows science's most accurate radio forecasting, a new service to radio operators and the public. Radio experts can now warn of approaching storms in the ionosphere which will interfere with shortwave broadcasts from such overseas points as London, Stockholm and Moscow. What is also important is that these forecasts, like weather forecasts, are made in sufficient time to be used in routing important messages and broadcasts.

Several days ahead the forecasters venture a guess, based on careful observations and calculations, as to whether the radio reception on shortwave sets will be good or bad. Three months in advance they predict the best frequency for large radio companies and radio amateurs to use in getting messages through to listeners in such distant places as Athens, Tokyo and Lima.

Echoes from radio reflecting layers in the upper atmosphere, spots on the sun, absorption of radio waves and other such information is used in these latest of science's forecasts. Detailed records painstakingly made in the past and up-to-the-minute communications telephoned and telegraphed daily from research stations all over the world are used by radio experts at the National Bureau of Standards in making these predictions.

Interestingly enough, both radar, one of the great developments of the war, and this new radio forecasting can be traced back in their scientific beginnings to radio echo experiments conducted at least two decades ago.

The S O S of a ship in distress at sea, the beam that guides a plane to a safe landing in a cloudburst, the messages with which explorers keep in touch with those at home, and the globe-encircling signals of radio amateurs and professionals are all made possible by reflection from one of the ionized layers. These layers consist of atoms with all the electrons knocked out. Even the lowest of the layers is many, many miles above the earth, several times higher than a man has ever gone in either plane or stratosphere balloon.

When a sending station issues a series of radio signals, the energy travels in two ways. One wave travels along the ground, gradually becoming less powerful as it spreads out over a greater area and as energy is absorbed from it. The sky wave travels upward until it reaches the ionized layer of the atmosphere and then is reflected back in much the same manner that light is reflected from a mirror.

A receiving station located only a short distance from the transmitting station will pick up the signal from the ground wave first, then receive it as an echo from the sky wave. A station a hundred miles or so away will probably receive only the sky wave.

Depends upon Frequency

Whether radio waves will be reflected by the lower ionized layer about 40 or 50 miles above the earth's surface, or whether they will penetrate it and continue up to some greater height, to be reflected by one or another of the higher layers, sometimes extending 250 miles above the earth, depends upon the frequency or wavelength of the impulse.

The greater the frequency or the shorter the wavelength, the higher will the radio impulse penetrate into the ionosphere and the longer will be the time interval before the echo returns. The maximum frequency which will be reflected by each layer, called the critical frequency or maximum usable frequency for that layer, varies with the time of day, season of the year, longitude and latitude, and also with solar activity as shown in the sunspots.

In broadcasting overseas, it is best to use one of the highest permissible frequencies because when too low a frequency is used, the radio waves tend to be absorbed by the ionosphere. The frequency that a powerful radio station or "radio ham" uses in broadcasting a message would lie within the band of possible frequencies, between the highest frequency that will bounce back from the upper reflecting layer and the lowest frequency that will get through to the reflecting layer without being absorbed.

By combing files kept by astronomers as well as by broadcasters and radio listeners, and by checking day-to-day reports, radio experts at the National Bureau of Standards have noticed a number of general trends useful in making predictions. A higher radio frequency can ordinarily be used in daytime in winter than in summer, whereas at nighttime a higher frequency generally can be used in summer than winter. When the path of the radio waves, following the great circle, lies near the equator, shorter waves can be used in broadcasting than when the path goes through the polar regions.

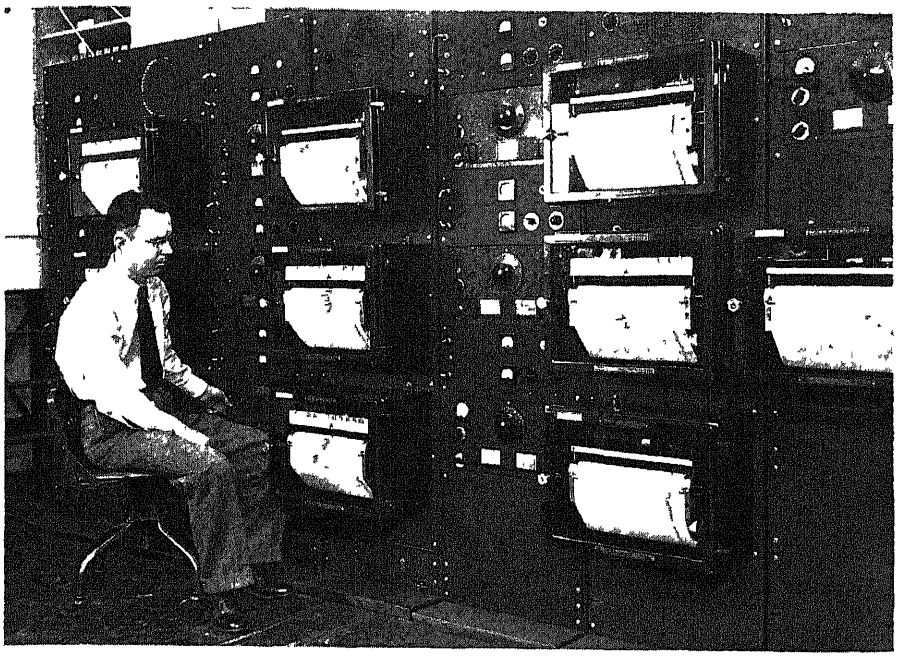
Shortwave broadcasts are more likely to get through when they pass through the equatorial regions than through the polar regions. Ionospheric storms start in the polar regions and from there spread out through the temperate zones. If the storm becomes violent, the reception of local broadcasts may become poor and telegraph messages fail to get through. Few violent storms, however, extend into the tropics, upsetting communications there.

When a broadcast is being sent by a station only 2500 miles or less away, conditions of the ionosphere midway between the stations are considered in deciding the frequency to use and in determining how loud or faint the reception will be. When the stations are quite far apart, however, the conditions of the ionized layer at two or more points must be taken into account. The lowest critical frequency of these points is the one which determines whether a message gets through or not.

Two Frequency Bands

When the stations are less than 2500 miles apart, two frequency bands are usually employed for communication or broadcasting. One is used during the day and the other at night. When the stations are quite distant, three or more frequencies have to be used. One is employed at night, one during the day, and a third, intermediate one, for hours around sunrise and sunset.

It is normally possible to use higher frequencies during the day than at night. The highest radio-reflecting layer, extending from around 100 to 250 miles above the earth, is always present, while the lower layers are present only during the day. It is the sun's ultraviolet rays that ionize the atmosphere. The upper



TEST STATION—Intensities of broadcasts picked up from ten test stations in such distant places as England, Honolulu, Africa and Chile are continually recorded at the Sterling, Va., Radio Receiving Station of the National Bureau of Standards. These records are used to study the amount radio waves are absorbed by the ionosphere.

regions, where the air particles are spaced so far apart, stay perpetually ionized The lower ones, ionized during the day, return to normal at night

Geomagnetic and ionospheric storms, experts at Interservice Radio Propagation Laboratory of the National Bureau of Standards found, tend to recur 27 days later, this being the time the sun takes to make a complete rotation so that the disturbed surface is again facing the earth It is easier, they found, to foretell what radio reception will be several days ahead when sunspot activity is at a minimum than when the sun's face is quite pock-marked

Prolonged, moderate disturbances are frequent during sunspot minimum. Briefer, more erratic storms tend to occur during sunspot maximum But as data for a complete sunspot cycle, about 11 years, are not yet available, further study is needed to work out these general trends.

When an ionospheric storm is in progress, a lower and lower frequency must be used as higher ones escape through the ionized layer On the other hand, more and more of the lower frequencies are absorbed and fail to reach the receiving station. When the frequency band is so reduced at both ends that nothing gets through, radio broadcasts are completely blacked out

A warning of approaching trouble in the ionosphere which will make the announcer's voice sound mushy or weak, or cut him off the air entirely, is now being broadcast for paths across the North Atlantic If broadcasts from London, Berlin and Paris are likely not to get through, "W's" (dot, dash, dash in Morse code) follow the time announcement over WWV at 15 and 45 minutes past the hour Sent out from Washington D C, the warning may be received at 2 5, 5, 10 and 15 megacycles, audible at almost any place in the world If conditions are quiet, "N's" (dash, dot in code) follow the time announcement over the shortwave broadcast

Radio experts, developing new techniques as they perfect this new type of forecasting, have a pretty good batting average Checking the warnings with actual radio reception, it is found that they have warned of seven out of ten storms

These forecasts are being developed to the point that those listening to a world-wide hook-up will no longer be bothered by having a broadcast from London ruined by sputters or having Moscow fade out entirely Instead of those tantalizing pauses after the announcer says "Come in Berlin," it will be known in advance whether broadcasts from such far-off places can get through

Science News Letter, April 13, 1946

AERONAUTICS

Maximum Speed for P-80 To Be Determined

➤ A SERIES of power dive tests by a remote-controlled Lockheed P-80 to be conducted in May or June will show Army Air Forces experts just how fast the plane can fly and give them information to be used in designing high-speed aircraft of the future

Maj Gen B W. Chidlaw, deputy commanding general, engineering, Air Materiel Command, said that a "mother" plane will guide the test craft on its dangerous mission

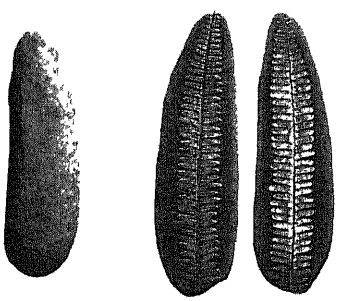
He reported that the planes for the test are now being fitted out at Bell Aircraft Corp, Niagara Falls, N Y, and they are expected to be ready within two months

A television camera in the test plane will give a constant picture of the control panel, while a ground control unit will direct landings and take-offs and inform the "mother" ship of the technical operation of the robot craft

Tests are scheduled to begin with dives at an oblique angle and build up to a perpendicular dive from a high altitude

Science News Letter, April 13, 1946

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No *whale oil* is used in the United States in making margarine, although large quantities are used for this purpose in certain other countries

There are many types of *mahogany wood,* but mahogany from Cuba and Santo Domingo is preferred in fine furniture making because of its close grain, silky texture and beautiful color

Roasted eggs may soon be on the market; in roasting they are whirled briefly at 235 degrees Fahrenheit, which centers the yolk, and the cooked egg will keep for months at ordinary temperatures

Tantalum, which has some of the physical characteristics of steel and the chemical characteristics of glass, is used by bone surgeons, when implanted in the body, there is an almost complete absence of fibrous tissue reaction to it.



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GENERAL SCIENCE

Science at Parting of Ways

For future progress it must have peace, freedom from outside control, recruitment of young workers, National Academy President declares.

➤ SCIENCE, like all the civilization of which it is a part, is now at the parting of the ways, Dr Frank B Jewett, president of the National Academy of Sciences, indicated in a lecture before the Yale chapter of Sigma Xi, national research honor society If it is to fulfill its great prewar promise it must have a long period of peace, freedom from military or other outside control, and the renewed and continual training of considerable numbers of young research workers

The war practically stopped fundamental scientific research in this country, Dr Jewett told his audience. Men who had been doing this kind of work were diverted into the war-spurred search for immediate military and industrial applications of the great body of facts that constituted our intellectual stockpile They accomplished great and necessary things—but no additions were made to the stockpile

These men, our basic research corps, are now returning to their regular tasks There have been no really severe losses from their number, but they are all four or five years older And behind them there is a lost generation of research students—the several thousands of exceptionally talented young people who should have been in the universities and other graduate training schools during the past five years but who have been in the armed services or in civilian war work instead Those thousands of lost man-years of scientific work can never be made up, the best we can do now is to avoid any further loss of time as far as possible and get the young men back into research training as fast as they are demobilized.

Wartime work on application of research results gained in prewar years accomplished marvels under rather strict military controls, but such controls will never do for normal scientific work, the speaker emphatically declared.

"No matter what plausible arguments are advanced, fundamental science cannot flourish in peacetime under the regimentation of a wartime setup," he told his listeners "Fundamental science can be aided—it cannot be directed Its fruits are those of the free mind and no one is wise enough to know what another man's brain cells may produce if afforded opportunity to function freely."

Support for future research, Dr Jewett said, divides itself into two phases Applied or industrial research will not have a particularly difficult time in getting all the backing it needs Big corporations have their own research staffs, smaller concerns have access to the facilities of such special establishments as the Mellon or Battelle Institutes

"In the field of fundamental science," he continued, "the picture is not quite so clear There has been much talk that in the future much of the work that has been done in educational institutions will be taken over by institutes devoted exclusively to research I have a strong feeling, however, that the great bulk of the contributions will continue to come from educational institutions where research and teaching are combined"

Science News Letter, April 13, 1946

All-aluminum ships are planned in Norway and may soon be under construction, the country has an abundance of electric power to produce aluminum locally and to use in welding the metal plates in the shipyards.

Among new fibers for cloth are *Ardil,* made from peanut protein; *Soylon,* a soybean base material, *elastic nylon* with long-range rubber-like elasticity, and *resin fiber* exceptionally resistant to chemical and biological deterioration

THE SCIENTIST IN ACTION by W. H. GEORGE

A SCIENTIFIC STUDY OF HIS METHODS

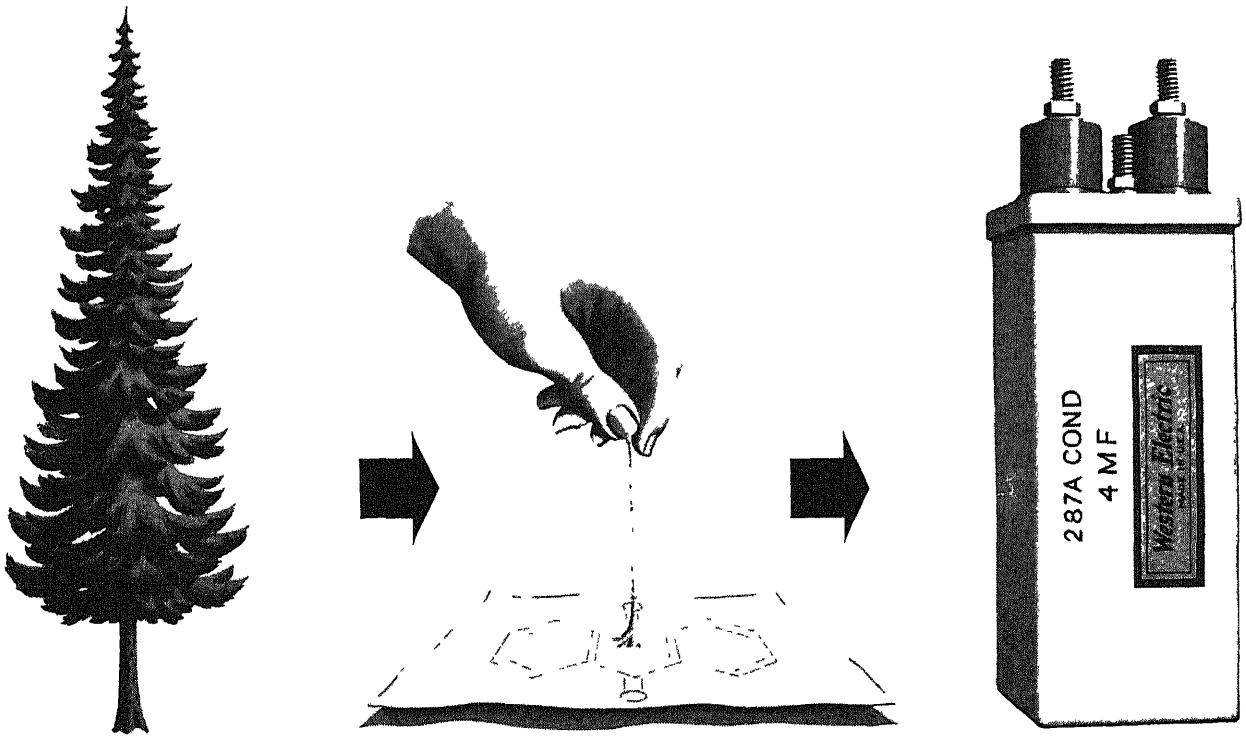
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LIFE-EXTENSION BY THE GRAM



CRUCIAL links in every wire and radio system are paper capacitors — rolls of impregnated paper and metal foil At least one is in every telephone — and more than 100 million are in the Bell System. A single failure can sever a telephone call, put a costly line out of service. So finding out how to make capacitors stand up longer is one of the big jobs of Bell Telephone Laboratories

All-linen paper was once the pre-eminent material. Then wood pulp was tried — and found to last longer under heat and direct voltage. But why? Something in the wood was helping to preserve life What was it?

Ultra-violet light, delicate micro-chemical analysis and hundreds of electrical tests gave a clue Researchers followed it up—found the answer by treating the impregnated paper with anthraquinone — a dye intermediate. A mere pinch of the stuff prolongs capacitor life by many precious years

When war came, great quantities of capacitors were urgently needed for military equipment, where failures could cost lives, lose battles. The Western Electric Company, manufacturing for the Bell System, willingly disclosed the life-preserving treatment to other manufacturers Today in communication capacitors, the new "life-extension" is helping to give more dependable telephone service.

Day by day, resources of this great industrial laboratory are being applied to perfect the thousands of components which make up the Bell Telephone System

BELL TELEPHONE LABORATORIES *EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE*

Books of the Week

AN INTRODUCTION TO POLYNESIAN ANTHROPOLIGY—Te Rangi Hiroa (Peter H Buck)—*Bishop Museum,* 136 p., map, $1 Bernice P Bishop Museum, Bulletin 187

COLLOID CHEMISTRY Theoretical and Applied, Vol VI—Jerome Alexander, ed—*Reinhold,* 1222 p, tables and illus, $20 General principles and specific industries, synthetic polymers and plastics Papers by selected international contributors

CRANIOMETRY OF AMBRY ISLAND—Wilfrid D HAMBLY—*Chicago Natural Hist Museum,* 158 p, maps, tables, illus., $2 75 Fieldiana Anthropology, Vol 37, No 1

HOW CHARACTER DEVELOPS A Psychological Interpretation—Fritz Kunkel, M D, and Roy E. Dickerson—*Scribner,* 287 p, $2 50. The first presentation in English of the psychological system of the senior author The book is intended to give parents and teachers an insight into the development of personality during childhood.

MODERN MANAGEMENT IN CLINICAL MEDICINE—F Kenneth Albrecht, M D—*Williams & Wilkins,* 1238 p, tables and illus, $10 A reference book for everyday practice, presenting for 21 different categories of diseases, a clear picture of the rationale of therapy together with useful and usable information

THE NATURE OF PATENTABLE INVENTION Its Attributes and Definition—John E. R Hayes—*Addison-Wesley,* 183 p, $5

SCIENCE AND SEIZURES New Light on Epilepsy and Migraine—William G Lennox—*Harper,* 258 p, tables and illus., $2, 2nd ed A new edition of an important book, containing information on the new drug tridione

THE SKELETAL ANATOMY OF FLEAS (SIPHONAPTERA)—R. E Snodgrass—*Smithsonian Inst,* 110 p., illus, 65 cents Smithsonian Miscellaneous Collections, Vol 104, No. 18.

TECHNIQUES OF GLASS MANIPULATION IN SCIENTIFIC RESEARCH—Julius D Heldman—*Prentice Hall,* 144 p, diagrs. and illus, $3 60. Designed for the technician, the chemist, the biologist, the physicist, and all others who at some time find it desirable to repair breaks in glass apparatus or to fabricate not-too-complicated pieces of glass equipment

TRAINING YOU TO TRAIN YOUR DOG—Blanche Saunders—*Doubleday,* 180 p, illus, $3 A scheme for training which offers something beyond the routine obedience tests, and is aimed at forming the dog's character, the book is based on the idea that it is the owner that needs training

VALUES FOR SURVIVAL—Lewis Mumford—*Harcourt,* 314 p, $3 Essays, addresses, and letters on politics and education written during the period between 1938 and 1946, reviewing the struggle that lies behind and defining the even greater struggle that lies ahead

Science News Letter, April 13, 1946

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ENGINEERING

Smokeless Coal Furnace Will Go on Market Soon

➤ SMOKELESS coal furnaces, a dream of inventors for more than a century, will be on the market within two years, J R Fellows, professor of mechanical engineering at the University of Illinois, predicted at the spring meeting of the American Society of Mechanical Engineers

Prof Fellows said that trial furnaces of the new type developed by the University of Illinois, and the Battelle Memorial Institute of Columbus, Ohio, are being used successfully, and manufacturers are now getting service experience before making the furnace generally available

The Illinois hand-fired smokeless furnace uses a down-draft coking principle with fresh coal being slowly converted into coke in the coking chamber in the upper forward portion of the furnace This coke is then burned in the coke-burning chamber in the lower rear part of the unit

As the coal gases are released, they are drawn under the baffle and mixed with secondary air coming in through passages in the baffle wall This gas-air mixture is ignited by the incandescent surface of the bed of burning coke

Nearly 100 samples of coal from all parts of the country were tested at the University of Illinois with the conclusion that most varieties of bituminous coal can be burned smokelessly in the new furnace, Prof Fellows said

He said records for one of the furnaces installed in his home showed a 30% fuel saving, and tests on more than 100 trial installations indicate that the hand-fired smokeless furnace will duplicate the efficiency of conventional stoker-fired furnaces

Science News Letter, April 13, 1946

METALLURGY

Balsa Wood and Aluminum Alloy Form New Material

➤ LAYERS of balsa wood between thin sheets of high-strength aluminum alloy, and all bonded together to form single light, rigid units, constitute a new construction material suitable for use in airplanes, prefabricated homes and for many other purposes The new material, which will be known as Metalite, was announced by the Chance Vought Aircraft Division of the United Aircraft Corporation in Stratford, Conn.

In the new material, the grain direction of the balsa core is set perpendicular to the metal faces. The core material is relatively thick in comparison to the face plates In its fabrication, a core material of greater density than balsa can be used in spots where greater strength is desired The bonding is carried out under moderate heat and pressure It can be done in a mold where single pieces of special shapes are desired

In airplane construction, it has a particular advantage, the manufacturer claims, because whole panels can be fabricated with scarcely a single protuberance to interrupt the air flow, a difficulty which rivet heads present

Metalite will be suitable for use in the construction of prefabricated houses, it is claimed, and for many other uses including household equipment, where its lightness and strength are an advantage

Science News Letter, April 13, 1946

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ECOLOGY

NATURE RAMBLINGS
by Frank Thone



Death and Resurrection

➤ CHRISTENDOM, during the coming week, commemorates the age-old drama of the death and resurrection of its central figure. Even the least devout, perhaps unknowingly, make use of the traditional symbols of death and resurrection—the seemingly lifeless egg out of which comes new life, the rabbit that springs vigorously out of a hole that might have been taken for a grave, the flowers that emerge from apparently dead seeds and bulbs. Some of these symbols are older than the creed with which they have become associated, even the heathen could not bear the thought of death being the end, and sought cheer and hope in these vernal reassertions of life.

But there is a deeper and more widespread symbolism—as universal as death and life—that no religion, old or new, seems to take much account of That is the endless cycle of death and resurrection that we see wherever things are growing. As summer approaches, we regret the death of the lovely early flowers, as autumn passes, we lament the fading and falling of the leaves They lie in the common tomb of the earth, and decay has its way with them

Yet if death and decay did not occur, there would soon be no more life on the earth Growth would go on for a few seasons, but presently all the food-making (and hence life-making) elements in air and earth would have been extracted by the plants and locked up in their tissues If they got no leave to die, the last generation of plants would have to stand forever, cursed with sterility, living but not growing because the last means of growth was already locked in their miser utches. A world without death would a world too monstrous to contemplate

Because there is death in our normal world, and decay afterwards, life continues to be possible Dead flowers and leaves, and dead tree trunks and animal bodies, all fulfill their destiny and return to the dust from whence they came In doing so, they endow the very dust with the potentialities of life, for from the decay of dead things comes the humus that makes a soil fit for the support of living things Into the earth blessed with the products of death we thrust our seed, and "look for the life that is to come"

Science News Letter, April 13, 1946

BACTERIOLOGY

Germs of Two Types Kill Japanese Beetles

➤ JAPANESE beetles can be killed by either of two different types of milky-disease germ, but not by both at the same time—if that's any consolation to a doomed beetle This discovery was made by Dr R L Beard, of the Connecticut Agricultural Experiment Station in New Haven, Conn (*Science*, March 22)

In experimental inoculations, Dr Beard found that if the germs of Type A and Type B of the milky disease are injected into the same beetle, a few days apart, the insect will eventually die of the type it receives first If both kinds are injected simultaneously but in unequal quantities, death will be caused by the one given in the heavier dose The two strains thus appear to be competitors

One practical significance of this discovery might be that it is important to keep pure strains of milky-disease cultures when preparing to fight beetle infestation with this disease, as is widely done nowadays If the two are mixed, their mutual antagonism might render the attack on the beetles less effective

Dr Beard states that it has not yet been learned whether these two strains have an antibiotic effect on each other, or whether some other mechanism is involved

Science News Letter, April 13, 1946

ENGINEERING

Nazi Wind Tunnel Now At Ordnance Laboratory

➤ THE SUPERSONIC wind tunnel used by the Nazis in all their experiments leading to the development of the V-2 rocket bombs is now peacefully reposing at the U S Navy Ordnance Laboratory in Washington, D C

Originally part of the Germans' experimental station at Peenemunde, the tunnel was removed to Kochel, in Bavaria south of Munich, late in the war to protect it from Allied bomb attacks It was discovered there by American troops late in the war

Calling the tunnel "a rare prize," U S Navy experts say that it was used at the Peenemunde station for all the experimental work on V-2

Included in the cache are models of shells, grenades and rockets that were tested for air pressures in the supersonic tunnel. Also captured were the Schlieren mirrors used to photograph the air flow about the supersonic projectiles

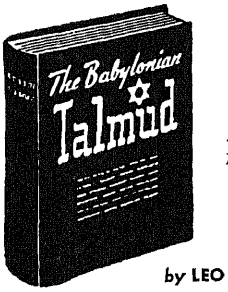
The Nazis had a bank of 120 manometers for measuring pressures in the wind tunnel Most unique feature of the captured wind tunnel is its large, quick-opening valve

When the valve is opened, air passes through an opening 27½ inches in diameter Opening this large passage in about one second is considered to be a remarkable achievement by the American scientists who have studied the captured equipment

Installed at Peenemunde, the Germans had a 1,100 horsepower pump that allowed the 40-foot vacuum sphere to be evacuated in five minutes

Science News Letter, April 13, 1946

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•New Machines And Gadgets•

⚙ *DRINKING GLASS, recently patented, has an exterior coating of heat-insulating material that also strengthens the glass and makes it "sweat"-proof. The coating is a suitable flocking material blown onto the lower two-thirds of the glass and held by an adhesive*

Science News Letter, April 13, 1946

⚙ *EMERGENCY TRUCKS for police departments carry in protective compartments every conceivable device needed in rescue work These include floodlights powered with special generators, two-way radio, inhalators, rifles, fire axes, jacks, nets, poles, ladders, 1,000 feet of wire and certain electrical equipment*

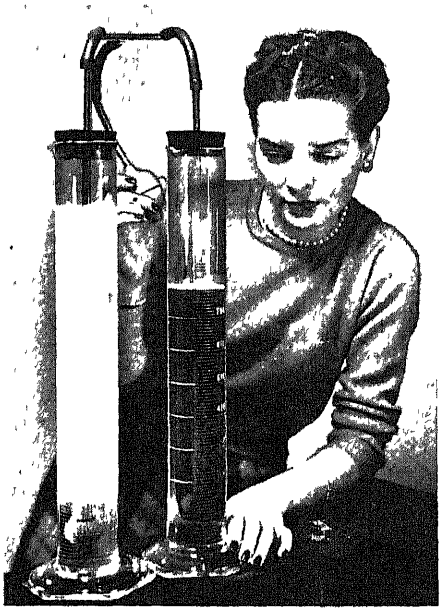
Science News Letter, April 13, 1946

⚙ *CARD TABLE TOP, recently patented, has holders for keeping the cards in an upright position in front of each player The holder consists of four parallel slots in the table top into which the cards may be inserted The slots vary in depth, with the deepest one to the front so that the rear cards can be seen over the others*

Science News Letter, April 13, 1946

⚙ *BOAT SEAT UNIT, to eliminate jars and jolts in high-speed motor boats in rough or choppy waters, has two double-action hydraulic shock absorbers, two variable-rate coil springs and a torsion bar. The shock absorbers control the action of the springs, the torsion bar helps hold the seat on a given plane*

Science News Letter, April 13, 1946



⚙ *ANTI-FOAM agent prevents oil in high-speed engines from bubbling and frothing due to air-mixture The picture shows the effect when air is forced through treated and untreated oils The agent, composition still secret, reduces surface tension on each individual bubble as formed, causing it to break quickly on reaching the surface*

Science News Letter, April 13, 1946

⚙ *TANK TELESCOPE, adaptable to many civilian uses, can keep a target in focus as it magnifies from four to eight times It uses a glass-without-sand optical system which renders a superior target image over a greater field-of-view, and true colors even at the extreme edges*

Science News Letter, April 13, 1946

⚙ *ILLUMINATED COMPACT has a small dry battery and bulb that light up the face of the user when applying powder or other cosmetics When the hinged cover of the compact with its inside mirror is opened, a switch is revealed by which the light is turned on*

Science News Letter, April 13, 1946

⚙ *ELECTRIC HEATING pad has 30 heat controls that give the user a choice of 30 different temperatures A handy light illuminates the temperature dial, and a newly developed rubberized casing permits the pad to be placed directly on a wet dressing*

Science News Letter, April 13, 1946

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Question Box

AERONAUTICS

How will the maximum speed for the P-80 be determined? p 235

AVIATION-MEDICINE

How can a ripcord be pulled automatically? p 230

BACTERIOLOGY

How have germ-free animals been reared? p 229

BOTANY

What will make Easter lilies bigger and better? p. 230

CHEMISTRY

What is 2,4-D? p 229

CHEMISTRY-MEDICINE

What fact may be the key to the way in which streptomycin works? p 229

ELECTRONICS

What is sonar? p 231

ENGINEERING

How soon may smokeless coal furnaces be on the market? p 238

GENERAL SCIENCE

What is necessary for the future progress of science? p 236

MEDICINE

What medicine has been found effective against pernicious anemia? p 233

METEOROLOGY

How does the Navy plan to study the weather at heights of from 100,000 to 500,000 feet? p 232.

PHYSICS-ENGINEERING

What will be the main future use of atomic power? p 227

Where published sources are used they are cited.

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SCIENCE NEWS LETTER

Vol. 49, No. 16

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 20, 1946



Future Fryer

See Page 250

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946

PHYSICS

Measurement Standard

Transmutation of gold into mercury in the cyclotron has produced a standard which is ten times as accurate as the one now accepted.

➤ BY THE TRANSMUTATION of gold into mercury in the cyclotron—a reversal of the alchemists' dream—University of California scientists have produced a standard for the measurement of length which is proving itself to be ten times as accurate as the one now accepted

The standard for measurement is a spectrum line—at present a red light ray produced by making the atoms of cadmium glow

The new standard is a sharp green light ray produced by exciting the atoms of the transmuted mercury in a quartz tube with a high frequency radio beam until they give light

Measurements can be made with the green light ray with an accuracy of billionths of an inch The standard of measurement is used in the grinding of lenses and prisms, in the testing of nearly all optical equipment, and in a vast number of scientific experiments requiring precise measurements

The special type of mercury made from gold is the isotope, or "sister", in the mercury family with the atomic weight 198. It is produced by bombarding gold atoms with neutrons The gold atoms "capture" neutrons, becoming radioactive, and, after emitting electrons, turning into mercury 198

Ordinary mercury has a number of isotopes, and when it is made to glow each isotope emits a slightly different light, much as there are a number of different notes in a chord played on a piano. A spectroscope separates the light into its component parts, a light ray being present for each isotope.

Gold is transmuted into mercury 198 of such purity that less than one atom in a million is other than mercury 198 Therefore the sharp green line of mercury 198 is produced with great clarity and sharpness, undiluted by the light of other mercury isotopes, much as a single note on a piano is struck Its wave length does not vary by more than one fifty-billionth of an inch

About five milligrams—half a cent's worth—of gold is used in the transmutation of enough mercury to make a "lamp" for mercury measurement standard. The Berkeley scientists estimate that hundreds of thousands of times as much mercury 198 could be produced by using the "pile" technique used in the atomic bomb project as can be produced in cyclotron bombardment

The superiority of the mercury measurement to that of cadmium is due partially to the fact that mercury atoms are heavier and can be made to glow at temperatures below freezing Heat makes atoms move faster, and lighter atoms move more than heavy ones The lightness of cadium atoms plus the fact that they must be heated to 300 degrees centigrade to produce the red light ray result in a fuzzier line than the mercury ray.

The cadmium standard of length was adopted in 1893 as the primary standard of length, and had not been improved on until the mercury ray was produced The Berkeley scientists believe it will be possible to produce a mercury "lamp" which can be plugged into a 110 volt alternating current outlet This is much simpler than the cadmium equipment, which requires a furnace

Mercury for a dozen lamps has been produced in cyclotron bombardments Several lamps have been sent to the Bureau of Standards for experimentation, some have been sent to the Eastman Kodak Company, while others are used in university laboratories

Transmutation of gold into mercury 198 was accomplished by Dr Jacob H Wiens, now a staff engineer of the U S Electronics Research Laboratory on the Berkeley campus, and Dr Luis Alvarez, professor of physics and one of the nation's leading young atomic scientists.

Science News Letter, April 20, 1946

PHYSICS

"Baby" Betatron Produces Inexpensive Radiations

➤ RADIATIONS equal to three grams of radium are produced at one-tenth the cost of radium by a four-million volt, "baby" betatron built at the University of Illinois

Smaller and simpler than the push-button controlled 20-million volt betatron, the new device is expected to be used for X-ray work in science and industry

"It can be used in place of radium for taking X-rays, but has the advantage of an initial cost only one-tenth that of the radium to produce equal energy," declared Prof Gerald M Almy, who headed work on the new betatron

The new machine is safer than radium, and concentrates its beam in one direction instead of all directions Sharper X-ray pictures result from the betatron's pin-point beam that is more intense than any useful amount of radium, according to Prof Almy

Lone disadvantage reported was that the new betatron requires an operator in charge while it is running, where radium, once it is placed, requires no further attention.

The four-million volt device for science and industry consists of an electromagnet, 15 inches wide, 25 inches long and 8 inches high, mounted on a wheeled frame and arrranged so that the beam can be swung up or down. The voltage is generated from a doughnut-shaped ceramic tube 8 inches in diameter that is located inside the hollow of the rectangular electro-magnet

Electrons released from a glowing filament in the tube are accelerated by magnetic force and hurled against a tiny ray-creating target

The power unit, connected to the magnet by a flexible cable, is kept at least ten feet from the betatron during operation, a safe distance for the operator whose control panel is on the power unit.

Prof Almy claims the design is so simple that any laboratory machine shop can build a "baby" betatron, three of which have been built at Urbana and at least one other, made from the same plans, has been constructed at Ohio State University.

University of Illinois scientists are now working on a giant, 250-million volt betatron expected to produce cosmic ray effects

Built during the war, the new betatrons were produced under the auspices of the Office of Scientific Research and Development

Science News Letter, April 20, 1946

E600 is a German insecticide developed during the war, some claim it is better than DDT

There are about 300 varieties of *olive trees* from which olives and olive oil are obtained, the oil content depends not only upon the variety but upon soil and climatic conditions.

CHEMISTRY

New Elements Named

Americium and curium are the names given to the two newest elements, 95 and 96, by their co-discoverer, Dr. Glenn T. Seaborg.

➤ THE TWO NEWEST chemical elements to be discovered, numbers 95 and 96, were christened "americium" and "curium" by their co-discoverer, Dr Glenn T Seaborg, of the Metallurgical Laboratory, University of Chicago, in an address before the American Chemical Society meeting

Made synthetically from uranium and plutonium as a consequence of the atomic bomb research, americium and curium were manufactured in the University of California cyclotron at Berkeley by bombarding U238 and Pu239 with 40,000,000 electron volt helium ions Dr Seaborg announced the discovery of these two elements last fall

The chemical symbols of the new elements will be Am and Cm

Element 95 is named after the Americas, or the New World, and element 96 is named after Pierre and Marie Curie, the great leaders in the study of radioactivity

When neptunium, element 93, and plutonium, element 94, were discovered they were named after the two planets Neptune and Pluto, beyond the planet, Uranus, in the solar system, after which element 92, uranium, was named But when two more elements were manufactured, there were no more planets of the solar system after which to name them

So Dr Seaborg, who was also co-discoverer of plutonium, used in the atomic bomb, used analogy with corresponding elements in the periodic table to guide him in naming his new chemical babies

He found that the new elements were members of a series of elements, which he called the actinide series because its first member is actinium This corresponds with the series of chemical elements known as the lanthanide earths which begin with lanthanum The shells or layers of electrons in the atoms of these elements have similarities Element 95 has six of what the chemists call 5f electrons and corresponds to the element europium, with six 4f electrons, which was named after Europe This suggested to Dr Seaborg naming element 95 after the Americas Element 96 has seven 5f electrons while gadolinium, with seven 4f electrons, was named after Gadolin, a great investigator of the rare earths This sugggested naming 96 after the Curies

The preferred pronunciation of americium, according to Dr Seaborg, is a-mer-ic'i-um, pronouncing the "ic" like "is" in this The name of this new element is not likely to come into such common usage as many other elements, such as plutonium, one of the fissionable atomic bomb elements, but there may be some tendency in the future to shorten or corrupt it by dropping out the second letter i as has been done in the American usage of aluminum, which in England is still known as aluminium.

Curium is simpler to pronounce, the c being sounded like k

Co-discoverers of americium and curium with Dr. Seaborg are R. A James, L O Morgan and A Ghiorso in the Metallurgical Laboratory at the University of Chicago, one of the Manhattan (Atomic Bomb) Engineer District projects Dr J G. Hamilton and his group at the University of California are credited with vital participation and cooperation throughout, rebuilding the 60-inch cyclotron to produce the high-energy particles needed, and who performed the bombardments

Dr Seaborg is professor of chemistry at the University of California on loan to the atomic bomb project and he will shortly return to Berkeley

Science News Letter, April 20 1946

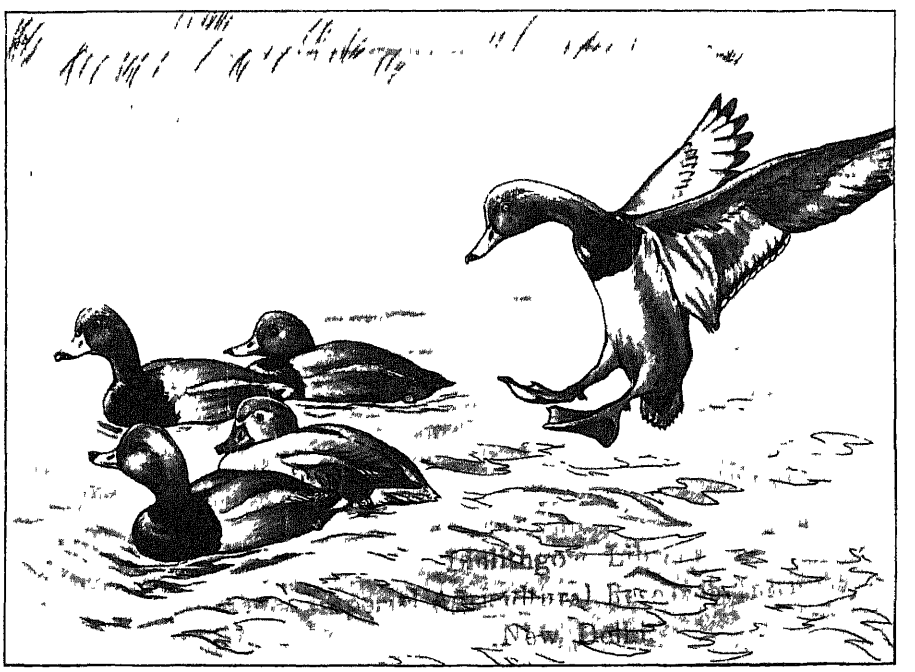
CHEMISTRY

Anarchy in Molecules Determines Stretchability

➤ RETENTION of its stretchability by rubber depends on the maintenance of a state of internal anarchy among its molecules, Dr W. O Baker and Dr N. R Pape, of the Bell Telephone Laboratories, reported to the American Chemical Society

X-ray studies of natural rubber stretched and stretched again until it stiffened and lost its elasticity showed that the molecules had assumed an orderly, crystal-like pattern Types of synthetic rubber that do not thus become brittle under strain showed X-ray patterns indicating that their molecules never became really orderly

Science News Letter, April 20, 1946



DUCK STAMP—This Federal migratory-bird hunting stamp for the 1946-47 season is taken from a drawing by Robert W. Hines and will be available to hunters and philatelists on July 1. Sold for $1, the stamps provide funds that help finance the Federal Government's refuge program.

GENERAL SCIENCE

Army "Goes Scientific"

Young officers will receive special training, young scientists to be commissioned as officers. The war demonstrated how important science is in national security.

➤ THE POSTWAR U S Army is going to be a much more scien e-minded organization than it was before Pearl Harbor, Secretary of War Robert P Patterson announced, in the course of the principal address delivered before the opening session of the meeting of the American Chemical Society

"We are setting up a long-range program to augment the number of Army personnel educated along scientific lines, not with the thought that we would be self-sufficient in these fields but in order to provide a larger group of highly skilled persons for key positions in research and development and in order to strengthen our contacts with scientists and technologists, Secretary Patterson stated

"Three measures are involved

"1 Commissioning in the regular army of promising graduates of advanced technical schools and universities,

"2 Sending younger army officers of demonstrated aptitude to technical schools and universities for advanced post-graduate work in the basic sciences,

"3 Offering better inducements to civilian scientists to take employment with the War Department and to remain in this activity

"This program will succeed only if more adequate recognition by way of rank and prospects of promotion is extended to those who devote their careers to research and development, and such recognition will be given"

World War II, Secretary Patterson said, demonstrated how important science could be as a factor in national strength, as World War I demonstrated the importance of industry One of the weightiest reasons for deciding to knock Germany out first, he disclosed, was a justified fear of what German scientists could do if given time enough There was no comparable peril, he commented, from Japanese science

Chemists made many direct contributions toward the better arming of America and her allies, the speaker pointed out The most destructive of air weapons, he declared, were not high explosives, but fire bombs, which were developed by chemists, both civilians and those in the Chemical Warfare Service Flamethrowers, also chemical weapons, figured decisively in the conquest of island stepping-stones to Japan

The principal reason why our enemies never resorted to poison gas, Secretary Patterson asserted, was that they knew we had greater stocks of deadlier gases than they possessed The same held true for the still-untried means of biological warfare, which were in the hands of the chemists In passing, he took occasion again to deny the much-circulated report that the Nazis possessed a poison gas that could get through the American gas mask

Beneficent byproducts of chemical research done in the first instance for war purposes include BAL, the British antidote for lewisite, which has been found to be a good remedy for arsenic and mercury poisoning, the higly toxic nitrogen mustard gases, which have shown beneficial effects on some types of cancer, and a compound known as di-iso-propyl-fluorophosphate, which gives promise in the treatment of glaucoma and myasthenia gravis

In conclusion, the speaker stated, "In all planning we must embrace the scientific research potential in establishing measures for national security, until the happy day comes, if it does come, when world peace may be accepted everywhere as an accomplished fact"

Science News Letter, April 20 1946

GEOLOGY

Bahama Banks May Hide Submarine Oil Field

➤ THE SHOALS of the Bahama Banks, a navigational hazard in the Atlantic Ocean east of the southern coast of Florida, may hide a submarine oil field, Prof John L Rich, University of Cincinnati geologist, told the American Association of Petroleum Geologists

Reporting on an aerial survey of the area, Prof Rich declared that the giant sand bars and ripples of the Bahama Banks bear a striking resemblance to the patterns of certain productive lenticular oil and gas sands in Ohio.

Situated between the Bahama Islands and Cuba, the shoal area has a depth varying between 6 and 30 feet Prof Rich flew over the region making aerial photographs from a height of 10,000 feet

He said that a series of photogrammetric maps of giant sand ripples visible through the clear water over the shoals revealed configurations exactly like parts of the Clinton sand area in Ohio, though on a smaller scale He urged further investigation of the Bahama Banks as a possible oil-bearing area

Science News Letter, April 20, 1946

Government men state there are some 13,000 *bears* in Alaska's two national forests

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ELECTRONICS

Cause Radio Disturbances

Speeding clouds from the sun have been discovered by a new method of observation that promises important developments in radio theory.

➤ SPEEDING CLOUDS of electrically charged gases racing from the sun into the upper layer of the earth's atmosphere have been discovered by a new method of observation that promises important developments in radio theory, H W Wells, J W Watts, and D E George, Carnegie Institution of Washington staff members, reported

The clouds from the sun were discovered during the magnetic-ionospheric storms of March 25 and 26 by investigators at the Ionospheric Laboratory near Kensington, Md, using a pulse-ranging method

The discovery indicates that ultraviolet light coming from the sun is not the only means of producing the ionized layers of air whose height and density above the earth are fundamental considerations in radio theory

During the magnetic storms, the Carnegie Institution scientists said, the clouds of charged, or ionized matter, rush to the ionosphere, moving in from long to short range and out again in intervals of a few minutes They come into the range of detecting instruments at heights of 500 to 600 miles above the earth at a speed of about one mile a second until they fuse with the layer of ionized air about 180 to 250 miles above the earth Occasionally they appear to break away from that layer and move out again at about the same rate

During these periods there are marked fluctuations in the ionosphere, and radio signals fade or disappear

The scientists who discovered the clouds say that they are caused by a bombardment of earth's atmosphere by irregular bursts of electrically charged corpuscles, which may be likened to streams of dust from the sun

Not to be confused with cosmic rays, these dust-like streams probably originate in or near the sunspots that are generally known to affect radio conditions

When the clouds rush into the ionosphere, they cause sudden changes in the so-called F-layer, which will normally bounce radio waves back to the earth to permit long-distance broadcasting

The distance that broadcasts can be heard is changed by the tendency of the newly discovered clouds to pull this reflecting layer away from the earth and then push it back As the clouds penetrate deeper into the lower levels of the ionosphere, additional ionization causes broadcast radio waves to be absorbed instead of reflected

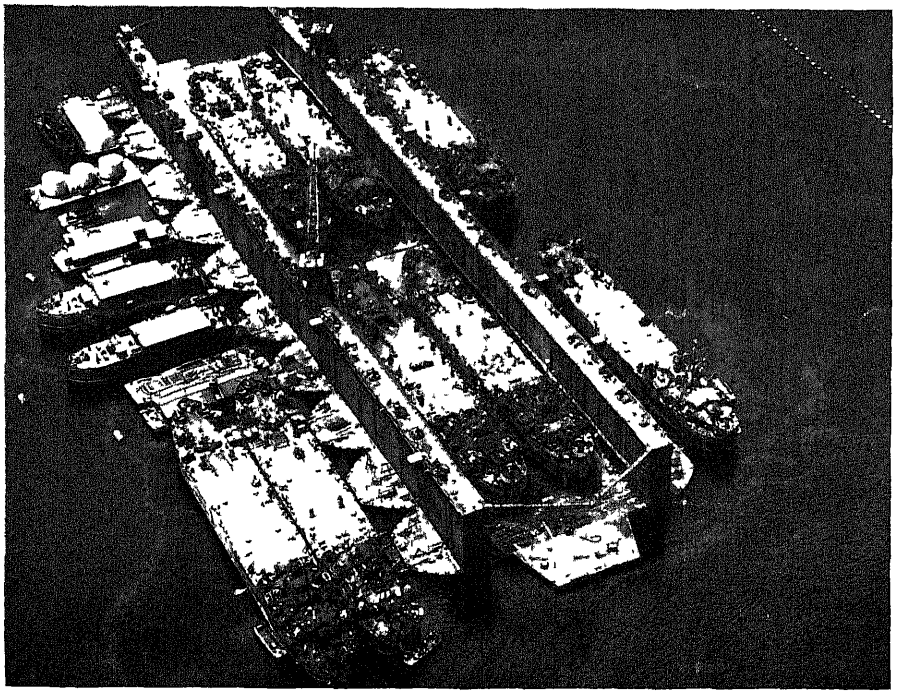
Thus, when the sun bombards the upper layers of the earth's atmosphere with these high-speed clouds, radio broadcasts may be sent different distances than normally or lost altogether

The instrument used in discovering these high-flying, radio storm clouds is a panoramic ionospheric recorder that sends out strong pulses of radiation into the upper atmosphere at adjustable intervals of 5 to 30 seconds

A motion picture camera records the images registered on a cathode ray tube as the pulses are reflected from high above the earth in the ionosphere

This pulse-ranging technique was the basis of radar, but the new equipment will detect atmospheric phenomena too swift for detection by earlier equipment

Science News Letter, April 20, 1946



REPAIRS IN COMBAT—Nearly 7,000 ships, ranging in size from P-T boats to the 53,000-ton battleship U.S.S. Iowa, were lifted out of the water for damage repair and reconditioning by the Navy's seventy-seven floating drydocks in the combat zones during the last year of the war. The Advance Base Sectional Dock shown here has lifted four LSTs out of the water, and more are tied up for repairs.

ENGINEERING

Floating Drydocks Used In Combat Zones

➤ SEVENTY-SEVEN floating drydocks, towed into war zones, enabled the Navy to make on the spot repairs that saved much valuable time during the war, it has been revealed

Vessels ranging in size from PT boats to battleships were among the 6,947 ships raised out of the water for repair jobs in combat zones during the last year of World War II, the Navy said.

Another 19 of the floating shipyards facilitated work on 1,349 warships at ports in the United States during the year beginning October, 1944 The program that began with three floating docks in 1940 found the Navy with 150 docks at the war's end with a capacity of 1,200,000 tons

Huge ABSD's, Advance Base Sectional Docks, provided floating repair installations for the largest battleships and aircraft carriers in the fleet.

Science News Letter, April 20, 1946

MEDICINE

Cancer Cause Suggested

Strong indication of a virus cause of the dread disease has been obtained by mice and chick embryo studies. Leads thus far called well worth following.

➤ CANCER MAY be a virus, one of those submicroscopic disease-causing agents that are already known to be responsible for such other maladies as smallpox, yellow fever and the hoof and mouth disease of cattle. Evidence to this effect was presented at the American Chemical Society meeting by Prof Roger J Williams, director of the Biological Institute of the University of Texas

First strong indication of a virus cause for cancer was obtained by Dr Alfred Taylor of the institute staff who succeeded in inoculating incubating eggs with cancerous material from mice A filtered extract from these eggs provoked new cancers when injected into healthy mice.

It has been found possible to keep the cancer-cultures going for many months by transplants from egg to egg, and the filtered extracts again caused cancers when re-injected into mice Something (possibly the virus) emanates from these cancers and produces malignant growth in nearby tissues

Various methods for separating out this virus, such as low-temperature drying and high-speed centrifuging, have been successful, but not consistently so The material thus obtained does not always "take"

One highly suggestive result has been the production of cancers in rats from the mouse material—"cancers," Prof Williams remarked, "which could not have arisen from the mouse material injected except through the agency of some virus-like cancer-producing agent." Again, however, results were not consistent

Lack of wholly dependable results is not discouraging the Texas group of researchers Leads thus far obtained are considered well worth following intensively

Streptomycin Keeps Better

➤ STREPTOMYCIN, penicillin's new companion in the germ-fighting business, keeps better than penicillin, Dr Peter P. Regna and Dr Leonard A. Wasselle of the research laboratories of Charles Pfizer and Company, Brooklyn, reported Well-dried streptomycin salts, containing less than one per cent of water, have shown no loss in strength after a year on the laboratory shelf.

Brittle Capillaries

➤ BRITTLE capillaries, which give rise to apoplexy if they break in the brain, or blindness if the hemorrhage occurs in the retina, can be restored to normal condition by the administration of rutin, a compound found in plants, the chemists were told by Dr James F Couch of the U S Department of Agriculture's eastern research laboratory at Philadelphia and Dr J Q Griffith of the University of Pennsylvania Success in the treatment of this disorder was obtained in a considerable number of cases whose subsequent histories were carefully followed.

Science News Letter, April 20, 1946

CHEMISTRY

More Powerful Than TNT

Called nitromethane, it is also much safer to handle. It is now made by mixing nitric acid and natural gas. Is now available for civilian use.

➤ NITROMETHANE, a high explosive much more powerful than TNT but much safer to handle, is now released from military restrictions and is available for civilian use, Harold Shechter of Purdue University announced at the meeting of the American Chemical Society Mr Shechter's colleagues in research leading to the cheaper and more efficient production of this useful detonating compound were H B. Hass, L G. Alexander and D. B. Hatcher

Nitromethane, as its name implies, is the nitrated form of methane, which constitutes about 85% of most natural gas, and which, under the names of firedamp and marsh gas, has long been known as a peril in some coal mines It is not at all new, having been first made in 1872, but production methods hitherto in use have not been efficient, and have used substances more expensive than methane, so that it has not been widely used where costs have to be counted Mr Shechter and his associates, treating methane with nitric acid under a pressure of 100 pounds per square inch, were able to obtain a very satisfactory yield

Since natural gas costs only three cents a thousand cubic feet in Texas, and since many wartime plants built for the production of nitric acid are now standing idle, there is no good reason why nitromethane should not be turned out in any needed quantity at relatively low cost, Mr Shechter pointed out

Inactive Vitamin B_1

➤ RAW CLAMS, and some kinds of raw fish, inactivate thiamin, or vitamin B_1, changing it into a different compound that has no vitamin value to mammals, Prof D. J. Hennessy of Fordham University told the chemists. He and his associates, S Warner, Dr K G Falk and J Truhlar, were stimulated to start their investigation by reports of the curing of paralyzed young foxes that had been fed in part on raw fish when they were given heavy doses of thiamin. The other ingredients of the young foxes' rations contained plenty of this vitamin, but something in the raw fish destroyed its dietary value.

Thiamin mixed with raw fish disappeared in the same way when a direct laboratory test was made Since civilized men seldom eat raw fish, but do eat raw shellfish, especially clams and oysters, the Fordham group tried the effects of these mollusks on thiamin Thiamin mixed with oysters retained its power, but when mixed with clams it became valueless

Chemical refining methods produced the compound into which the fish and clams had converted the thiamin Prof Hennessy has christened it "ichthiamin", which is a combination of the Greek "ichthus", meaning fish, with thiamin

Science News Letter, April 20, 1946

Cheese was preserved in Germany by dipping in polyvinyl acetate emulsion

CHEMISTRY

Atoms Make New Laws

Hot atoms have energies 10,000 times greater than atoms in ordinary chemical combinations and fly through solutions at enormous speed.

➤ HOT ATOMS from atomic nucleus transformations follow new rules of combination, Dr W F Libby of the University of Chicago told the symposium on nuclear chemistry at the American Chemical Society's meeting

These hot atoms, with energies 10,000 times greater than those involved in ordinary chemical reactions, fly through solutions at enormous speed, due to recoil from such nuclear explosions as the emission of gamma rays Such speeds, Dr Libby reports, make the particles collide with the atoms of the solution and ricochet like bullets hitting a wall

New types of chemical combination, resulting from these high energy collisions, are rather simple and predictable, according to the Chinese scientist. They can be used to make a radioactive hot atom replace an ordinary atom, thus tagging a compound whose subsequent progress through chemical reactions or life processes can be watched by following its radioactive behavior

Radioactive iodine, for example, can be made to enter the molecule of an organic compound, containing ordinary iodine In most molecules the hot iodine will replace its non-radioactive counterpart If, in some cases, hot iodine replaces a carbon or a hydrogen atom, the resulting compounds can be separated by chemical means

Quick Selection of Drugs

➤ A PROBLEM similar to finger-print classification or cataloguing the plants and animals of the world is posed for the chemist by the half-million chemical compounds isolated from natural sources or prepared in the laboratory Steps used in solving the problem of organizing all available chemical and pharmacological information on anti-malarial drugs were outlined by Miss Elinor D Hartnell of the division of chemistry and chemical technology of the National Research Council, with headquarters at Baltimore

Miss Hartnell told of the work done during 1941-1945 by the Survey of Anti-malarial Drugs operating under joint supervision of the National Research Council, the Board for the Coordination of Malarial Studies and the Committee on Medical Research of the Office of Scientific Research and Development

"The rapidity with which new compounds were tested and the sudden emphasis, as new chemical types developed promise, necessitated the creation of a new classification system capable of indexing any chemical compound which the pharmacologist could devise and which the chemist could prepare," said Miss Hartnell

Although the system was developed to show the relationship between anti-malarial activity and chemical structure, it is equally satisfactory for any problem involving the classification of miscellaneous compounds, Miss Hartnell claimed It is far simpler and more versatile than the old German system which has been in use since about 1910.

Under the new system complete information on any one of the more than 14,000 different drugs tested for anti-malarial activity could be made available in less than one minute, Miss Hartnell reported The new system, she adds, brings together for the first time all compounds having identical structural features

The anti-malarial research was a coordinated wartime program with chemical and pharmaceutical companies, universities and the governments of the United States and allied countries taking part The classification system of the compounds studied is to be published in monograph form.

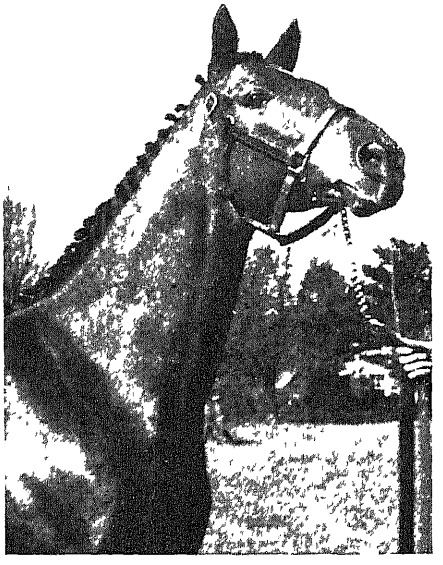
Elastic Nylon

➤ NYLON, nearly as elastic as rubber, has been produced on an experimental scale, according to Dr. Emerson L Wittbecker of the E I du Pont de Nemours & Company

Emphasizing that the development was still in the laboratory stage, he said that the elastic nylon is made from N-substituted polyamides

Science News Letter, April 20, 1946

Nylon rope, as a yachting rope, is expected to meet with great favor because of its strength, elasticity, and resistance to rot and marine decay



UNBEATEN—This is Nordlicht, handsome German thoroughbred race horse that the Army recently displayed at Front Royal, Va. Army pedigree experts claim that Nordlicht is one of the finest horses ever produced in Europe and say that accurate records show that the five-year-old never lost a race. The American Jockey Club, final authority on horse racing in the United States, refuses to register the war prize, so Nordlicht's blood cannot be introduced into American racing breeds.

NUTRITION

Germs Become Guinea Pigs In Nutrition Tests

➤ GERMS INSTEAD of guinea pigs may be used in future tests of processed foods to show their nutritive value, Dr R A Stewart and Dr R W. Carroll, of the Quaker Oats Research Laboratories, told members of the American Chemical Society Promising results, they said, were obtained in preliminary tests, showing comparative growth responses of microorganisms fed on chemically modified amino acids, which are the building-blocks of proteins

Other studies, made with the more conventional means of white rats as test organisms, showed that if cereals are overheated in toasting or other heat processing, the value of their amino acids is impaired. Ordinary chemical analyses failed to show the changes which these biological assays discovered.

Science News Letter, April 20, 1946

PHYSICS

Atomic Power for Future Super-Airliners

➤ URANIUM 235 and plutonium will power future super-airliners, if (and a very big if) successful international controls prevent diversion of atomic energy sources for purposes of war, prophesied Dr Glenn T Seaborg of the University of California and also of the Metallurgical Laboratory at the University of Chicago, co-discoverer of plutonium and of the new elements americium and curium

"Denaturing" atomic energy materials, he told the American Chemical Society, will not turn the trick alone It can only slow down possible conversion for military uses, but cannot wholly prevent it For full control, to insure civilization's safety, only international agreements, firmly made and kept in good faith, will suffice If this cannot be accomplished, it may be necessary to forbid completely all commercial applications of this revolutionary new energy source.

If the world can insure its own safety against misuse of atomic energy, revolutionary changes in industry such as the world has never seen are already at hand, the speaker declared First will come application of atomic energy in large stationary plants, to generate electricity by driving turbine-connected generators Then will come the propulsion of surface and submarine ships Finally, after the atomic pile has been freed of the load of graphite now necessary for keeping the output of energy within safe bounds, the atomic-energy unit will sprout great wings and take to the upper air

But none of these things can take place, without extreme peril to the whole world, until the necessary international controls can be worked out

Science News Letter, April 20, 1946

ICHTHYOLOGY

Schools of Fish Studied By New Instrument

➤ ACTIVITIES of fish in the dark of night, deep in the water, under a coating of ice or in a muddy river will be brought to light by a new instrument A combination light meter and photoelectric fish-detector, it incorporates the same "electric eye" that automatically opens doors and counts the number of passing autos.

Small and light in weight, this same instrument can be used in determining the extent to which the time at which certain types of fish migrate is influenced by the amount of sunlight reaching them, Dr Arthur D. Hasler of the University of Wisconsin and Dr Lester V. Whitney of Southwest Missouri State Teachers College state (*Journal of Wildlife Management*, April)

To get more information on the relationship between migration and light, Dr Whitney was asked to devise an instrument that would measure small quantities of light reaching three to four yards below the surface of the water at sunset The apparatus he developed has already been used successfully to chart migration times of schools of perch in Lake Mendota

Light intensity is measured by directing the photocell upward The number of fish passing by are clocked by directing the cell horizontally toward the light source—each interruption of the beam is recorded The cell itself is rotated by a cord reaching to the water's surface

A dim light is used so that the fish will neither be attracted nor repelled unduly by the light source The photocell and light source were placed as far apart as conveniently possible with a rowboat four feet wide

The number of deflections per minute recorded by the photocell was in keeping with the number of fish caught either in gill nets over definite periods or by hand lines from the same or nearby boats

Science News Letter, April 20, 1946

AERONAUTICS

VHF Transmitters Ready For Private Flying

➤ WITH THE Civilian Aeronautics Administration equipping airport traffic control towers for VHF (very high frequency) radio communications, compact, lightweight VHF equipment will fit conveniently into small private airplanes

Being shown to flyers throughout the country by Bendix Radio, Baltimore, Md., VHF for private planes includes a small transmitter with a 26-inch vertical rod antenna

While ground-to-air communication is not ready for VHF, the CAA program provides for immediate use of the very high frequency transmission from planes to ground stations.

Advantages claimed for VHF include all-weather reliability, no atmospheric static interference and greater transmission range for less power

Science News Letter, April 20, 1946

IN SCIENCE

MEDICINE

Rinderpest Vaccine Sent to China

➤ A MILLION doses of bacteriological warfare vaccine, which protects cattle against rinderpest, dread scourge of the Orient, has been sent to China through UNRRA, Maj Gen Alden H Waitt, chief of the Army's Chemical Warfare Service, revealed

Use of this war-developed protection against future famine in the Far East was made known when Gen Waitt appeared as guest of Watson Davis, director of Science Service, on the CBS program, Adventures in Science

"Rinderpest has many times decimated the cattle of great regions of Europe and Africa, leaving starvation in its wake," Gen Waitt said "The possibility existed that enemy agents would try to introduce this virus into the great cattle herds of the United States and Canada—and the paper balloons which floated over from Japan did not help to ease our anxiety Our great difficulty was the lack of an effective vaccine, which could be produced in the quantity required to stop an epidemic"

Intensive research by our Special Projects Division, in collaboration with colleagues of the British Commonwealth, developed a revolutionary new method of producing the required vaccine in almost unlimited quantity

"We no longer fear rinderpest in this country, for now its spread can be readily checked," Gen Waitt said "Of more immediate importance is the impact this discovery may have on the famine areas of India, China and the Pacific Islands Now their cattle may be protected against this dread disease, and successfully employed as beasts of burden and as sources of food, in regions where they could not survive before."

A chemical that can save lives threatened by arsenic and mercury poisoning, an antidote to lethal doses of cyanide gas, and chemicals which promise to lead to better remedies for glaucoma, myasthenia gravis and Hodgkin's disease are also the peacetime benefits of wartime research in the Army's Chemical Warfare Service which were described by Col John R Wood, chief of the medical division, CWS, also a guest on the same program.

Science News Letter, April 20, 1946

E FIELDS

MEDICINE

Vitamin Lack Seen As Cancer Factor in Women

➤ LACK OF VITAMIN B_1, or thiamin, may be the first link in a chain leading via the liver and female hormone to cancer of the uterus, it is suggested in a report by Dr J Ernest Ayre and Dr W A G Bauld, of the Royal Victoria Hospital and McGill University, Montreal (*Science*, April 12)

If the theory proves correct it should be possible, by two simple tests, to determine 1 whether the woman has cancer, 2 if not, whether she is likely to develop cancer, and 3 whether she has a deficiency of thiamin If the tests show a dangerous precancerous linkage between low vitamin and high female hormone concentrations, prevention of cancer might be possible through corrective treatment

The vitamin lack might operate to start cancer by damaging the liver, the Canadian investigators suggest The damage might be too slight to be detected by present tests of liver function, yet might be severe enough to keep the liver from inactivating female hormone This material might therefore accumulate in the body and cause cancer of the uterus

Studies of 23 patients plus findings by various scientists from studies of animals gives, the Canadian scientists state, "excellent circumstantial evidence to suggest that the nutritional deficiency may have been a primary factor leading to the malignancy"

Science News Letter, April 20, 1946

PUBLIC HEALTH

Watch Out for Ticks As Weather Warms

➤ THOSE OF YOU living where warm weather has come unusually early this year need to watch out for ticks earlier than usual, because it is the warm weather that brings these dangerous disease carriers out of their winter quarters. Rocky Mountain spotted fever and tick paralysis are diseases that may result from tick bite

If there are ticks in your vicinity, it would be wise to make night and morning tick inspection part of the daily routine for the children and the family dog Include any grown-ups who have been working in the shrubbery or underbrush or picnicking in the woods Every part of the body and the clothing should be carefully inspected for ticks If any are seen, use tweezers or piece of paper to remove them Never use bare fingers as you can get the disease from handling infected crushed ticks

Tick paralysis attacks children much oftener than grown-ups, the ratio being 10 to 1 It is thought to be due to a nerve poison which is produced by the tick and gets into the patient's body while the tick is attached for blood sucking

The disease starts suddenly, sometimes with inability to walk or stand, sometimes with a kind of paralysis Death may result in a few days The important feature of treatment of this disease, physicians who have treated it state, is to find and remove the tick If this is done early in the sickness, the patient will be well within one or two days Delayed removal of the tick sometimes fails to save the patient

Rocky Mountain spotted fever starts with a chill, headache, sweating, and pain in the abdomen, bones and muscles Other symptoms are the mottled rash and fever The sickness starts from two to 14 days after the virus causing it has entered the body

Science News Letter, April 20, 1946

GENERAL SCIENCE

South Africa Organizes Research Council

➤ A SOUTH AFRICAN Council for Scientific and Industrial Research has been organized as a government body with Dr B F J. Schonland, known for his researches upon lightning, as president

The new body is an organization similar to councils that have been organized in Great Britain, Canada and Australia

Attention will be given to development of agriculture, mining, and industry, as well as research in medicine, health and specialized scientific fields in universities and laboratories to be set up in the country

While the new body is governmental in organization, it will administer research funds from industry and gifts intended to promote research.

Dr Schonland will attend the British Empire Scientific Conferences in London in June as head of the South African delegation

Science News Letter, April 20, 1946

GENERAL SCIENCE

Research Programs Need Governmental Support

➤ MAJOR RESEARCH programs must in future come to depend increasingly on government and industry for support, Prof Hugh S. Taylor of Princeton University declared in an address before the University of Wyoming chapter of Sigma Xi, scientific research society of America Privately endowed universities and other institutions, he explained, will no longer be able to carry the main burden of research because "the necessary techniques of modern science, involving the production and control of high energy sources, have become almost prohibitively expensive to endowed institutions"

Research looking to more or less immediate application to industrial problems can turn with confidence to industry for its support, Prof Taylor told his audience The first World War caused a general awakening to the wealth-giving possibilities of applied science, the interim between wars saw a great development of industrial laboratories and industrial fellowships in universities, and the second World War, just finished, added unmistakable emphasis to the lesson

Support of basic research, without which the shorter-range programs of applied science must soon stagnate, offers somewhat more difficult problems, the speaker admitted Fundamental research, he said, is rarely directly or immediately profitable, nor can it readily be made self-supporting Its principal assets are long-range in nature, yet it is in such areas, free from the drive for profitable results, that freedom of inquiry and of spirit can best operate Here, in Prof Taylor's opinion, is where national and state support of research must come in

Support of research, however, must not connote too close control by the supporting governments, he emphasized Scientists must continue to be masters in their own households

"But," he concluded, "masters in their own households, there lies upon them the paramount necessity of integrating their skills and their findings with the broad stream of life which flows outside the laboratories In the free world to which we still dare to look forward we must integrate our skills with the social and spiritual aspects of human life and nature That goal attained, we shall not lack either direction or support for the sciences"

Science News Letter, April 20, 1946

AGRICULTURE

Fryers In Any Season

Agricultural scientists are producing fluffy chicks at all seasons of the year, hens that lay the year-around, eight-pound turkeys and broad-breasted poultry.

By A. C. MONAHAN

See Front Cover

➤ FLUFFY LITTLE CHICKS and Easter both come in the Spring Easter is at the height of the natural hatching season It is also at the height of the normal laying days, which perhaps accounts in part for the heavy use of eggs at Easter for Sunday morning breakfast, customary in some sections, and for the Easter Monday egg-rolling

But the association is, perhaps, diminishing Agricultural scientists seem never content with nature's ways and are producing fluffy little chicks at all seasons of the year so frying chickens will always be obtainable They are producing hens that lay the year-around, eight-pound apartment-house turkeys, and broad-breasted poultry with more white meat Fluffy little chicks, like the one in the staff photograph on the front cover of this SCIENCE NEWS LETTER, will grow into hens that lay 300 or more eggs a year



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Since science has entered the poultry field in the serious way it has in the past three decades, the former barnyard fowl has given first place in the poultry world to those on the modern chicken farm, where everything else takes a back seat to the poultry

This does not mean that ordinary farmers are no longer raising eggs and poultry meat Practically every farmer still has a flock, and some farmers have large flocks as a sideline to their dairy, beef or cash crop farming. It does not mean that village folks do not have their backyard chickens It means that in widely scattered sections of the country, specialized poultry farms with thousands of chickens, or ducks, or geese, or turkeys are in operation, and all activities center about the poultry

Cross-Breeding

There is little similarity between the modern hen and the miniature jungle fowl which provided the first skimpy chicken dinner some 5,000 years ago, and which still may be found in certain out-of-the-way places Ever since the early colonists brought poultry to the Western Hemisphere there has been improvement by selection and cross-breeding Nearly 100 years ago America had produced stock claimed to be superior to the usual poultry of Europe, by crossing birds brought by sailors from the Far East, the original home of the hen

It is only within the past half-century or so, however, that scientists have given special thought to raising poultry as a commercial enterprise, only within the past generation that a special effort has been made to classify poultry information into a real science

The growth of poultry courses in the state colleges of agriculture is an indication The New York College of Agriculture at Cornell University established a regular course in poultry in 1891. Rhode Island State College gave the first specialized course in the country in 1898 By 1904, ten of the colleges had courses in poultry husbandry For the past two decades or so all agricultural colleges have had collegiate courses, and short and extension courses as well

This is not intended to convey the idea that poultry scientists are all college-connected or that all the advancement in poultry husbandry has been made by the agricultural colleges and the experiment station affiliated with them Some of the most important work has been done by farmers and others specializing in poultry, many of whom, though not all, were college trained. Experts of the U S Department of Agriculture deserve special credit Some of the most progressive results have been obtained from work at the U S Department of Agriculture's poultry farm at Beltsville, Md

It was at this farm that the lightweight turkey suitable for small families was developed Some of these birds have proved to be excellent layers that produce three or four times as many eggs in a year as do ordinary birds Its eight-pound turkey will prove popular to apartment-house dwellers, and some day turkey eggs may sell on the market side by side with hen eggs

Perhaps the first object of the poultry scientists was to breed hens with vigor to withstand the vicissitudes of life that are at the same time good layers In this they have succeeded Some 30 years ago a hen that produced 200 eggs in a year achieved state-wide fame; today, 300-eggs-a-year hens are becoming commonplace.

Efforts now seem to be focused on developing a better meat-producer, particularly birds with broader breasts and more of the highly favored white meat, but also with "meatier" drumsticks and wings. Breeders are following the footsteps of their fellow scientists in beef and hog development, who have succeeded in more than doubling the weight in usable meat on their animals

The broad-breasted turkey is here and will soon become plentiful; the broad-breasted chicken is on its way. Promising results have already been obtained Breeders have learned that the descendants of the common hen can be made to acquire new forms and colors They developed the feeding and breeding formula that has added 30 eggs to the average hen's yearly production, and have found that in no branch of animal husbandry can results be obtained so rapidly as in the poultry industry

An organized search for a hen that will have at least 10 per cent more meat than its present-day counterpart is un-

der way It is headed by some 25 well-known poultry scientists with an equal number of sub-committee members and 600 poultrymen from all parts of the United States as advisers The activities are financed, and awards will be given, by the Great Atlantic and Pacific Tea Company, which has a particular interest because of the tremendous amount of poultry products it handles each year. The undertaking, known as the Chicken-of-Tomorrow program, is a three-year undertaking covering 1948

There are present indications that many war veterans, taking advantage of the GI Bill of Rights, desire to purchase land suitable for raising poultry and become chicken or turkey raisers It is a good business for those with proper training Poultry producing, in cash returns, is America's third largest agricultural industry It brings in over $2,650,000,000 a year

It is now producing considerably over an egg a day for every man, woman and child in the country, and also about 25 pounds of meat per person, but there is still room for expansion Poultry and eggs are rated among the seven basic foods for the American diet, being rich in proteins, minerals and vitamins

Double Consumption

Double the present consumption could well take place because, as every housewife knows, eggs are invaluable in many household kitchen dishes Also there is room for an expansion in the export trade, particularly for dried eggs

The common idea that anyone can raise poultry may be true, but whether or not they can do so successfully and secure an income is another question Business men, professional men, sailors and admirals facing retirement, are common among the persons who look forward to a life of ease raising poultry

As a hobby, a little chicken farm is a good idea Some will be very successful To be successful both brains and long hours of hard work are required, but no person seems to love his job more than the poultry lover with poultry instincts.

The veteran considering the poultry business as a means of livelihood needs to know what he is facing. If he likes poultry and long hours of work, and has a degree of training, he will probably succeed Poultry farming is one of the best paying agricultural enterprises for the man who makes a go of it

The fact that it is a 365-day-a-year job is an advantage if help is employed It is year-around employment for the owner and the helper Another advantage is that the business, except with turkeys, brings in cash every week. But even the turkey business is no longer just a Thanksgiving-and-Christmas seasonal market, the turkey demand now stretches over many months since Americans have learned to eat the bird at other times

The job requires training It is particularly important that diseased birds, and there are about 100 major diseases, be spotted in the daily inspection of the flock so that those with infectious difficulties can be removed before others are contaminated Training in one of the state agricultural colleges is desirable, but if this can not be had, the next best procedure for the man without poultry experience is to get employment for a year on one of the large modern poultry farms, and supplement the practical experience with reading and perhaps with college correspondence courses

Science News Letter, April 20, 1946

INVENTION

Rear View Mirror for Day or Night Driving

➤ A REAR view mirror for automobiles that gives clear vision in the daytime and glareless images from the brightest lights at night is the subject of patent 2,397,947, taken out by William H Colbert, Brackenridge, Pa The wedge-shaped mirror has two surfaces, one of relatively low reflectivity and transparent and the other a better reflector but opaque.

The front surface, the poorer reflector, is for night driving, while the back surface is for daylight The driver can adjust the mirror for night or day driving by slightly tilting the mirror

The patent has been assigned to Libbey-Owens-Ford Glass Company, Toledo, Ohio.

Science News Letter, April 20, 1946

CHEMISTRY

Modified Amino Acids Act Like Penicillin

➤ SOME MODIFIED forms of amino acids, instead of nourishing bacteria, check their growth more or less as penicillin does, Dr Sydney Fox, and associates, of Iowa State College, told the American Chemical Society One in particular, 3-amino tyrosine, was effective against *Staphylococcus aureus*, the germ of boils and some types of food poisoning, and at the same time was only slightly poisonous to white rats to which it was fed This, of course, is what biologists seek of an antibiotic to knock out the germs without making their victim sick

Science News Letter, April 20, 1946

ESSENTIAL

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Do You Know?

Electric *floodlights* near turkey roosts on one turkey farm kept foxes away

Avalanches in the Himalayan mountains are the most terrifying in the world because often they are of tremendous size.

Chloroform is not easily ignited but at high temperatures it breaks down readily into hydrochloric acid and phosgene

Mountain leather, a common name for the mineral palygorskite, is probably a variety of asbestos and can be used for many similar purposes

Carbon tetrachloride, used as a cleaning solvent, may cause poisoning if used in quantities over an extended period in a small, improperly ventilated room.

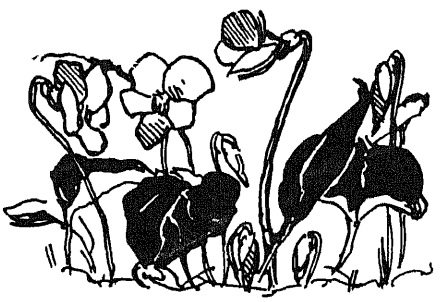
Only about one-fifth of the length of body of the South American *electric eel* is taken up with its vital organs, the rest is occupied by its power plant

Adrenochrome, a drug potentially useful as an adjunct to insulin for diabetics, has been made synthetically by a German chemist, its use permits the amount of insulin required to be reduced by more than one-half

BOTANY

NATURE RAMBLINGS

by Frank Thone



Hidden Resources

➤ CHILDREN have to be "don'ted" so much, in their eager gathering of spring flower bouquets, that it is refreshing to be able to tell them to go ahead and pick all they want to of one kind of flowers

These are the violets Except where they are so sparse and scattered that children will hardly want to pick them anyway, it is all right to gather violets without even heeding the usual injunction to "leave a few for seed"

For violets form few seed from the bright attractive flowers that children delight in That important job is well taken care of by a second crop of flowers of a totally different kind, that are produced in summer, after the showy flowers have had their day. These later flowers are small, inconspicuous, short-stemmed things that look like unopened buds They hide under the leaves, near the ground, and they never open They are fertilized internally with their own pollen, and produce abundant crops of seed without ever letting the world know about it This form of flowering and fruiting is known to botanists as cleistogamy, which is Greek for "hidden marriage"

After these cleistogamous flowers have formed and ripened their seed, the violet plant often returns to the production of its showy flowers, and continues to bear them until stopped by really severe cold People often exclaim over finding violets in autumn, but really there is nothing very remarkable about it Violets come about as near being ever-blooming plants as any of our wild flowers They will even bravely put forth their blue blossoms during a January thaw.

Violets, for all their delicate appearance, might well be chosen as symbols of hardihood and enterprise. They grow far up into the Arctic, and far up the highest mountains There are violets that manage to grow in the wettest of marshes, other violets that prefer the dry scanty soil of stony hillsides, and still others that spring up and flower briefly among the harsh shrubs of the desert when its barren curse is lifted for a spell by the short spring rains If the fact of survival is a testimony of fitness, the violet tribe must be among the fittest

Science News Letter, April 20, 1946

1946

ELECTRONIC EQUIPMENT AND ACCESSORIES

By R C Walker

Offers a wealth of specific information about the various applications of electronic devices and their accessories Every electrical engineer, mechanic and student wishing to keep in touch with modern progress will find this a worthy addition to his technical library

393 pages *Illustrated* *1945* *$6 00*

PLASTICS—Scientific and Technological

By H Ronald Fleck

The author has made a critical survey of literature and a correlation of scattered data of great value to chemists in the ever-growing plastics industry Also particularly suited as a text for college courses on the scientific and technical aspects of plastics

352 pages *Illustrated* *1944* *$6 50*

RUBBER IN ENGINEERING

A Symposium based on research by the Imperial Chemical Industries, Ltd

This book has been designed to interest a wide variety of readers Its main purpose is to furnish engineers with a general survey of the information available on the fundamental properties of rubber Complete with graphs and tables

304 pages *Illustrated* *1946* *$5 50*

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ENGINEERING

Lightweight Coal Car Made of Steel Alloy

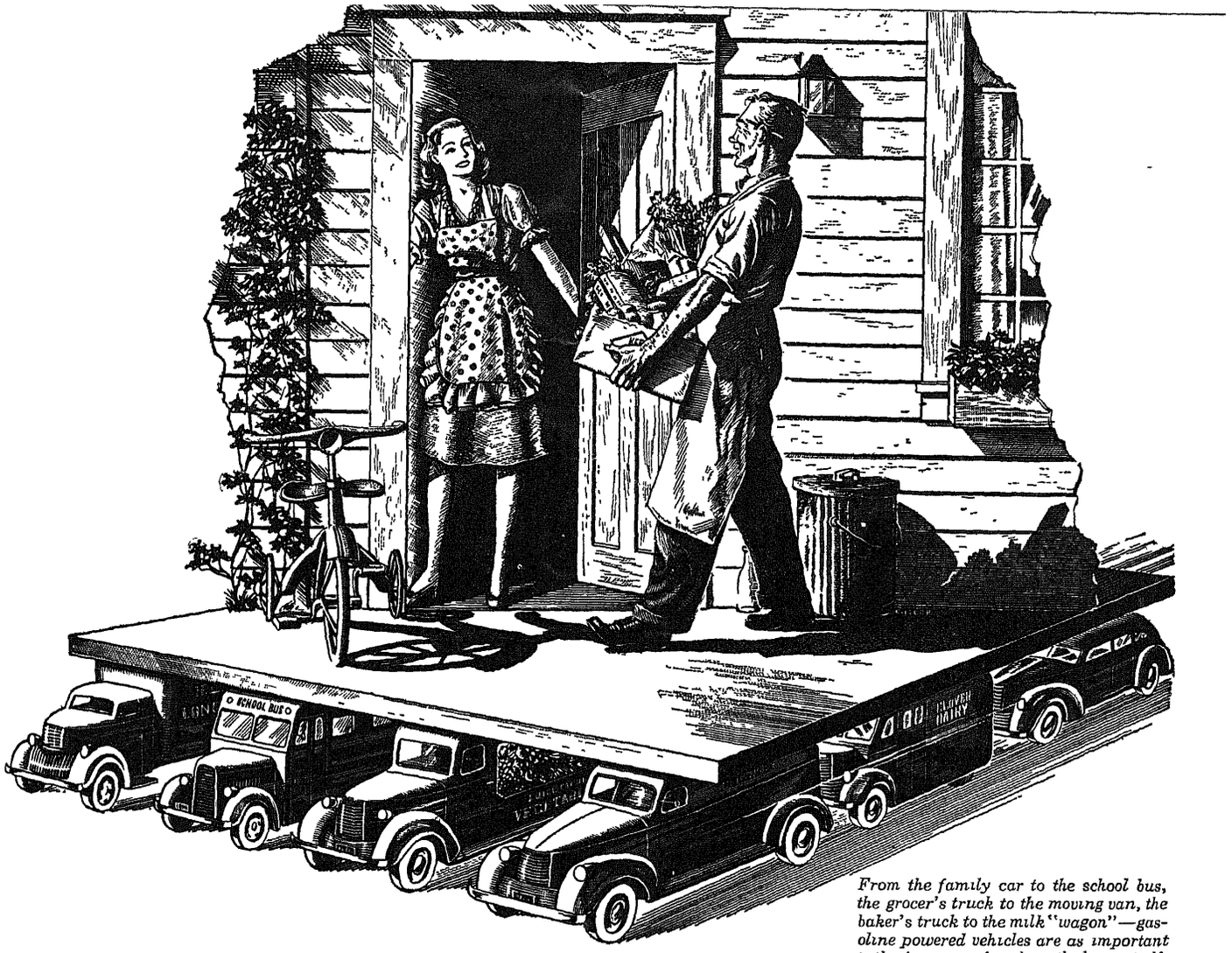
➤ AN ALL-WELDED coal car that is designed to eliminate 15% of the deadweight has been exhibited in Washington

The new hopper, produced by the railroad research bureau of the United States Steel Corporation, has an empty weight of 33,500 pounds That is 6,540 pounds less than standard cars built of carbon steel using Association of American Railroads specifications

Constructed of Cor-Ten, a steel alloy, the new coal car is claimed to have high strength and corrosion resistance that will mean longer life.

The steel alloy permits thinner sections, while welded joints simplify construction and provide seals against moisture and eliminate laps, the car's designers report

Science News Letter, April 20, 1946



From the family car to the school bus, the grocer's truck to the moving van, the baker's truck to the milk "wagon"—gasoline powered vehicles are as important to the American family as the home itself.

American homes run on gasoline

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• Books of the Week •

ANATOMY OF RACIAL INTOLERANCE—George B de Huszar, compiler—*H. W Wilson,* 283 p, $1.25. Articles by recognized authorities discussing what race is, the causes of, and the remedies for, racial prejudice

THE A PRIORI IN PHYSICAL THEORY—Arthur Pap—*King's Crown Press,* 102 p, $2 A study of the arguments involved among the different viewpoints regarding the nature of *a priori* truth

A S. T M STANDARDS ON PAINT, VARNISH, LACQUER, AND RELATED PRODUCTS—*American Society for Testing Materials,* 528 p, tables and illus, $2 75 Specifications, methods of testing, definitions of terms

ATOMIC ENERGY AND WORLD GOVERNMENT—Leopold Infeld—*Canadian Institute of International Affairs,* 20 pages, 10 cents. A statement of the technical and international problems put to us by our possession of the atomic energy secret, and a plea for international organization and cooperation as a solution to that problem

COLOR MEASURE AND ITS APPLICATION TO THE GRADING OF AGRICULTURAL PRODUCTS—Dorothy Nickerson—*U S. Dept of Agric,* 62 p, diagrs and illus, 25 cents A handbook on the method of disk colorimetry U S Dept of Agric, miscellaneous pub 580

A DESCRIPTIVE CATALOG OF THE SHORE FISHES OF PERU—Samuel F Hildebrand—*Smithsonian Inst.,* 530 p, maps and illus, $1 25 United States National Museum, Bull 189.

EGG TO CHICK—Millicent E Selsam—*International Publishers,* 32 p, illus, $1 The changes that take place from the time the egg is laid until the chick pecks its way out of the shell are described in clear, lively text, accompanied by pictures drawn by Frances Wells Suitable for boys and girls from 6 to 10 years old.

ENERGY SPECTRA OF STARS—C G ABBOT—*Smithsonian Inst,* 6 p, diagrs, 10 cents Smithsonian Miscellaneous Collections, Vol 104, No 22

THE FRESH-WATER FISHES OF SIAM, OR THAILAND—Hugh M Smith—*Smithsonian Inst,* 622 p, tables and illus, $1 50 United States National Museum, Bull. 188

HEARINGS BEFORE THE SENATE SPECIAL COMMITTEE ON ATOMIC ENERGY ON S 1717 Part 4—*Government Printing Office,* 69 p, 15 cents Statements of Mrs Harold A Stone, Mrs Allen C G Mitchell, John C Parker, Dr Ralph McDonald, Mrs Harper Sibley, Commander Stephen Brunauer, Maj. Gen. L R Groves

HEARINGS ON SCIENCE LEGISLATION (S 1297 and Related Bills) Part 6—*Government Printing Office,* 13 p, 5 cents Testimony of the high school students who were finalists in Science Service's Fifth Science Talent Search for the Westinghouse Scholarships

HOW TO KEEP YOUR FAMILY HEALTHY—*Franklin Watts,* 95 p, illus, $1 An informative, fully illustrated, easy-to-understand handbook of health problems, written by recognized medical authorities and assembled from articles in LOOK magazine

JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES—George Rosen, Editor—*Henry Schuman,* Quarterly, $7 50 a year A first issue of a new Journal

OMAHA BEACHHEAD—*Government Printing Office,* 167 p, illus, and maps, $1 50 The authentic history of the first seven days (6 June-13 June, 1944) of the U S invasion of fortress Europe The book covers every phase from the landing on the Normandy Coast through the hedgerow fighting to the Forest of Cerisy and Carentan

THE PHYSIOLOGY OF SEX—Kenneth Walker—*Penguin,* 183 p, 25 cents A clear, straightforward statement of the facts of sex and its problems in the life of the individual and the community Though Dr Walker writes strictly as a scientist for adult readers, he confesses his own belief that the questions raised cannot be satisfactorily answered in a world that is empty of spiritual values

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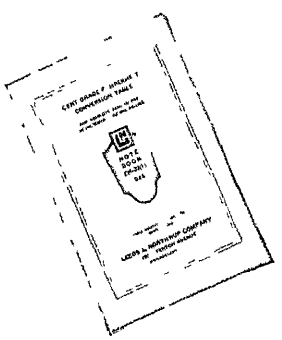
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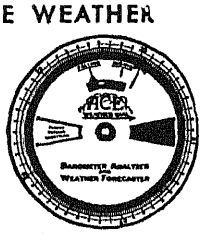
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CHEMISTRY

Detects Impurities

Ultraviolet light used in seeking out almost incredibly small percentages of aluminum in other metals, American Chemical Society told.

➤ ULTRAVIOLET LIGHT, causing dyestuffs to shine with ghostly visible radiations in the dark, has been put to use in detecting almost incredibly small percentages of aluminum existing as impurities in steels, bronzes and other metals, where its presence may be a weakening factor The new method was reported before the meeting of the American Chemical Society by Alfred Weissler of the Naval Research Laboratory and Prof Charles E White of the University of Maryland.

The metal sample is first dissolved, usually in an acid bath; then the dyestuff is mixed with it and the ultraviolet lamp is turned on The fluorescent light will betray the presence of aluminum if it is present in the original material in dilutions as low as a thousandth of one per cent. From this up to about one per cent is a range in which the fluorometric method can be used to advantage for quick determination of aluminum Advantages claimed are "speed, sensitivity, accuracy and freedom from interference"

Germ-Killer from Tomatoes

➤ TOMATOES, good for you because of their vitamin content, may play another part in adding to health through production of an anti-germ remedy, it appears from a report by Thomas D Fontaine, George W Irving, Jr, and S P Doolittle, of the U S Department of Agriculture

These scientists have isolated from the tomato plant a new antibiotic, or material of the penicillin class, which they call tomatin In test tube experiments it has marked activity against germs of both the gram positive and gram negative groups It is also particularly active against some of the fungi that cause disease in plants and animals

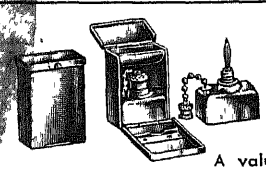
Athlete's Foot Remedy

➤ DISCOVERY that a vitamin K-like substance exerts a powerful action on the four fungi that commonly are responsible for athlete's foot, was reported by Milton J. Golden and Kurt A Oster of the research laboratories of McKesson and Robbins, Inc, Bridgeport, Conn, at the meeting of the biological chemistry division

They said laboratory tests on market preparations for curing the common skin ailment showed that most substances used have a ceiling of activity Thus, after a certain amount of a remedy has been applied, additional amounts do not exert any more influence

Science News Letter, April 20, 1946

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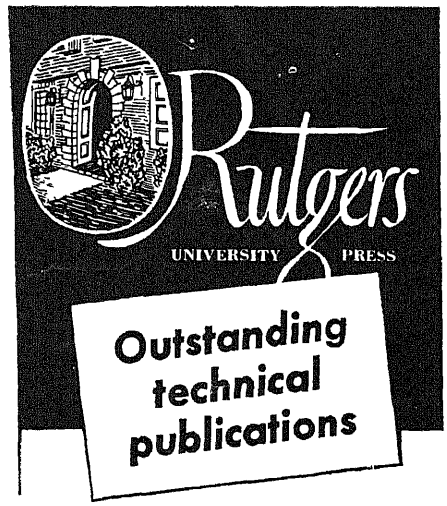
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•New Machines And Gadgets•

⚙ *DUSTING MOP for household floors has suction similar to that of the ordinary vacuum cleaner for rugs The triangular mopping pad is covered with a low-fitting housing through which the dust from the mop is pulled by the motor fans into a dust bag*

Science News Letter, April 20, 1946

⚙ *TWEEZER SPOT welder, a 25-pound portable machine, has a pair of insulated copper tweezers at the end of a flexible cord, and also a foot switch The tiny pieces of metal to be united are held in tight contact by the tweezers, and the foot lightly pressed on the switch*

Science News Letter, April 20, 1946

⚙ *POWER-DRIVEN plane, a hand tool of the bench plane type, has a flat disk with cutting edges set in its base, and an electric motor above the center of the plane's block to rotate the disk Fan blades, also rotated by the motor, discharge the chips and keep the motor cool.*

Science News Letter, April 20, 1946

⚙ *TOOTHBRUSH attachment is a drip cup device that prevents liquids on the brush from running down the handle to the annoyance of the user The elongated cup has an opening in its base through which the handle of the brush is passed Elastic edges on the opening prevent leakage*

Science News Letter, April 20, 1946



⚙ *TOY PIANO, claimed to be the first one with a chromatic scale, has gleaming plastic keys in a keyboard that covers almost 2½ octaves. It is a miniature grand in shape, as can be seen in the picture, and has removable legs so that it can be rested on a table*

Science News Letter, April 20, 1946

⚙ *MOTOR-DRIVEN typewriter eraser has an elongated housing in which is a tiny motor and drive shaft The circular eraser, of ordinary desk size, is mounted on the end of an extended flexible drive shaft which permits it to be turned at various angles Speed is controlled by a rheostat*

Science News Letter, April 20, 1946

⚙ *TREE GUARD protects the tender bark of young trees from rabbits and other bark-eating animals It is a strong, curled fiber sheet of hard, tough material, split on one side Held open while being placed around the tree trunk, it snaps back into position when released*

Science News Letter, April 20, 1946

⚙ *WEED EXTRACTOR resembles an ordinary cane with a pivoted short cross-arm near its lower end One end of this crossarm rests on the soil; the other is bent downward at a right angle, forming, with the end of the cane itself, a pair of jaws to grasp the weed*

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St, N W, Washington 6, D C, and ask for Gadget Bulletin 907

Science News Letter, April 20, 1946

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Question Box

AERONAUTICS

What new transmitters are now ready for private flying? p 248

AGRICULTURE

What is considered the normal number of eggs for hens to lay in a year now? p 250

CHEMISTRY

How is ultraviolet light used to detect incredibly small percentages of impurities in metals? p 255

What are the names of the two new chemical elements? p 243

What explosive is more powerful than TNT? p 246

What studies have suggested a virus cause of cancer? p 246

ELECTRONICS

How were speeding clouds from the sun found to cause radio disturbances? p 245

MEDICINE

What may vitamin lack have to do with cancer in women? p. 249

NUTRITION

How are germs used as guinea pigs? p 247

PHYSICS

What machine produces inexpensive radiations? p 242

What measurement standard is ten times as accurate as the one now accepted? p 242

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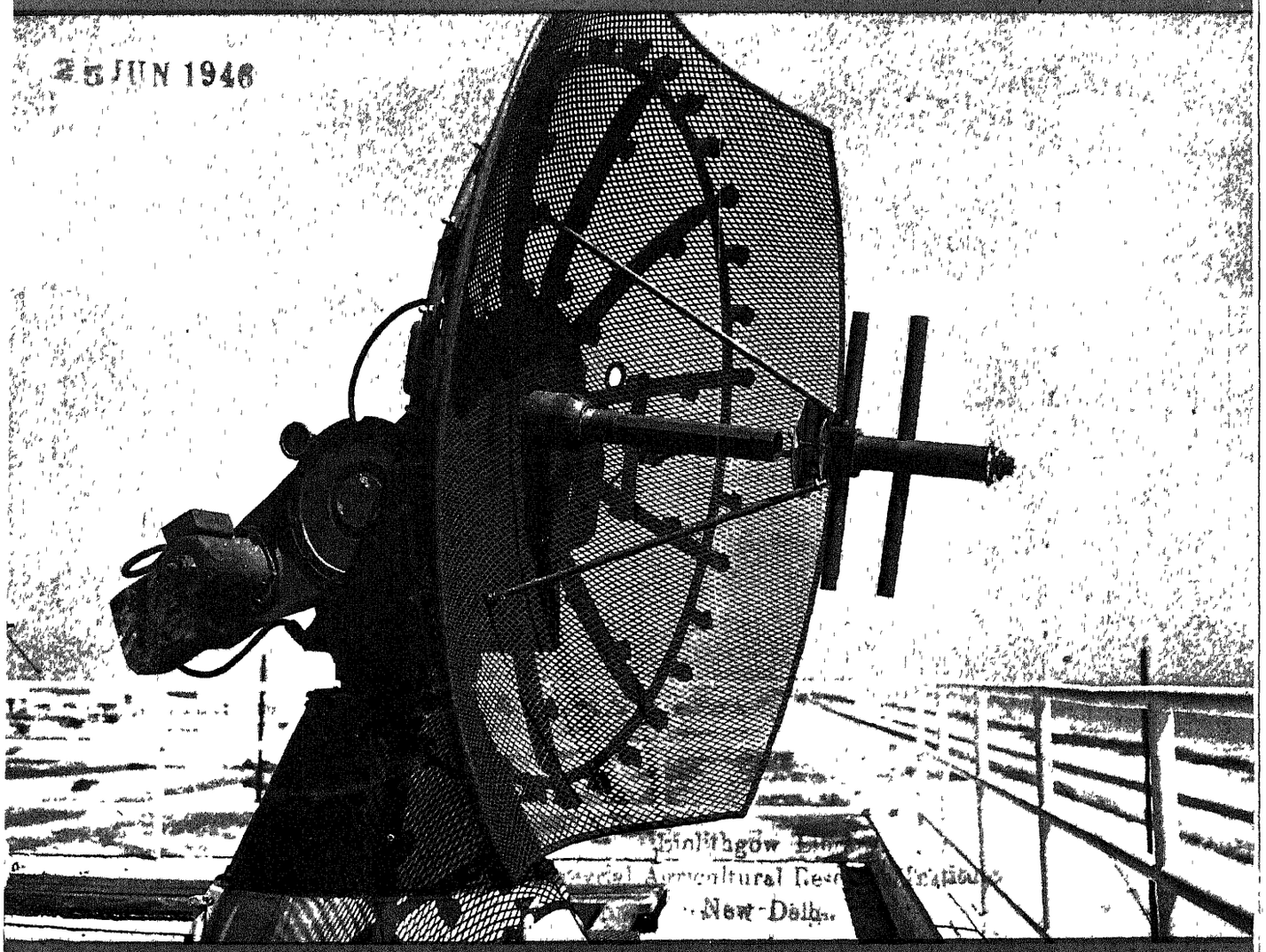
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SCIENCE NEWS LETTER

Vol. 49, No. 17

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 27, 1946

25 JUN 1946

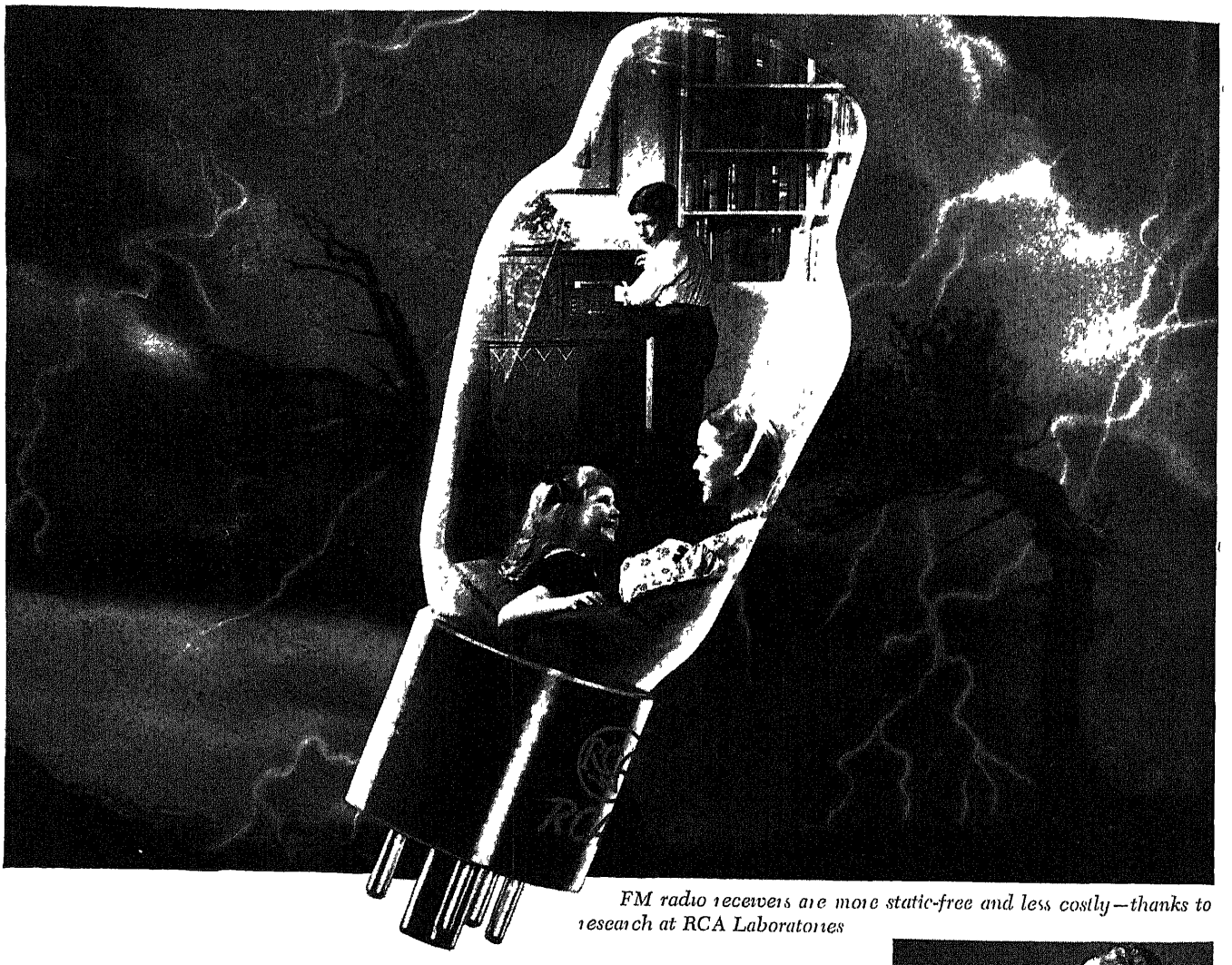


Safe Landings

See Page 261

A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946



FM radio receivers are more static-free and less costly—thanks to research at RCA Laboratories

NEW FM - noiseless as the inside of a vacuum tube!

Now, FM, or Frequency Modulation reception, provides still greater freedom from static and interference caused by storms, ignition systems, oil burners, and domestic appliances

It's radio at its finest—making your living room a part of the concert hall itself You've no idea of how marvelous music can sound over the radio until you hear the golden perfection of FM reception developed by RCA.

Moreover, through this new RCA development, FM receivers can be made at a cost comparable to that of standard-band broadcast receivers FM is no longer expensive! "Better things at lower cost" is one of the purposes of RCA Laboratories — where similar research is constantly going into *all* RCA products.

And when you buy anything bearing the RCA Victor name — from a television receiver to a radio tube replacement—you know you are getting one of the finest instruments of its kind that science has yet achieved

Radio Corporation of America, RCA Building, Radio City, New York 20 Listen to The RCA Victor Show, Sundays, 4 30 P M , Eastern Standard Time, over the NBC Network.



Stuart William Seeley, Manager of the Industry Service Laboratory, RCA Laboratories Division, perfected this new FM circuit It not only operates equally effectively with strong or weak stations, but lowers the cost of receivers by eliminating additional tubes and parts that were formerly considered necessary in Frequency Modulation receivers

RADIO CORPORATION of AMERICA

MEDICINE

ACS Serum Explained

It is not a cure for cancer, though it does relieve pain when pain is outstanding symptom. Life-lengthening and other claims due to confusion.

By JANE STAFFORD

➤ THE ACS SERUM developed by a Soviet scientist has now been given to some 3,500 patients in the United States The exact figure cannot be given because the final count has not yet been made

This is the serum you may have read or heard popular accounts of as being able to lengthen human life to 150 years and to cure or prevent a host of diseases such as cancer, arthritis, Hodgkin's disease, infections and mental disease

ACS is not a cure for cancer. That much can be stated unequivocally, I was told by Dr. Harry Goldblatt, of Western Reserve University School of Medicine, in the course of a search for facts from American scientists who have been studying the serum.

Dr Goldblatt has prepared the serum and because of "premature publicity and the great demand for it from patients," he has given it to physicians in clinics, hospitals and private practice instead of limiting its use to the relatively few patients he could treat and follow himself The physicians who were supplied the serum have been sending in their reports and Dr Goldblatt is now studying them preparatory to publishing the results in a scientific journal

Besides the fact that the serum does not cure cancer, Dr Goldblatt has so far found one other fact from the reports he is studying This is that the serum relieves pain in some cases of cancer when pain is the outstanding symptom and has not been relieved by anything else The pain, however, is the only thing affected The patients die just the same

The hope that ACS would cure or prevent cancer and other diseases and lengthen human life seems to have arisen through confusion over the original reports on the subject Prof Alexander A Bogomolets, director of the Institute of Experimental Biology and Pathology, moved from Kief to Ufa during the war, developed the serum which has the full scientific name of anti-reticular cytotoxic serum He made it by inoculating horses with an extract of the spleen and bone marrow of human cadavers

Prof Bogomolets long had been interested in problems of longevity He believed that the human life span should be 125 to 150 years. The life span of other animals is five to six times longer than the period of their maturation, so why should not humans live five to six times longer than the period it takes for them to reach maturity? is the way he reasoned

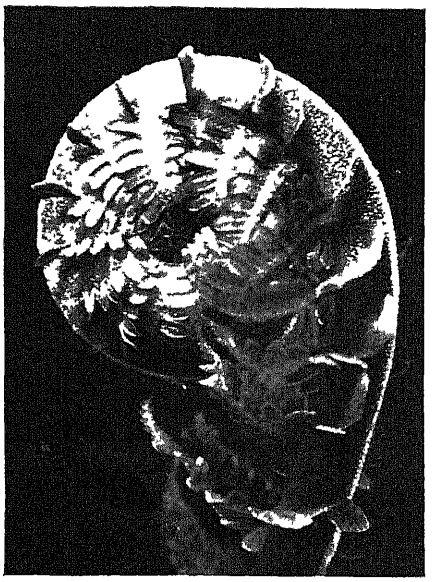
Studying human physiology, he came to the view that the physiologic system of the connective tissue is the arena in which disease processes develop Connective tissue, as its name implies, binds together and supports various structures of the body. The layman recognizes connective tissue in bones and cartilage but it is found in many other structures According to the modern view, it is not merely a skeleton or framework for body structures but has other functions as well

In this arena of connective tissue is fought the battle between disease germs and the cells of the body that try to devour the invading germs The cells that engage in the fight make up another system of the body, called the reticulo endothelial system They are found in various parts of the body but are especially abundant in the liver and spleen

Keeping the system which takes part in the fight to protect the body against disease and injury at a high level of activity is, in Prof Bogomolets' view, one of the most important problems in treating disease His anti-reticular cytotoxic serum was designed for this purpose of stimulating the reactivity of this system

Believing the system fundamental for protection of the body against assault by germs or other disease-causing agents, Prof Bogomolets believed his stimulating serum might prove effective against a variety of diseases including some that come as the body ages It might therefore protect against premature death.

This was presented by Prof. Bogomolets as theory, together with the facts of how the serum was prepared and a report that in minute doses the serum stimulated the reticulo-endothelial system while in large doses it had cytotoxic, or cell poisoning, effects on the system.



NATURE'S ARTISTRY—The ostrich fern, uncoiling from the soil in the spring of the year, presents one of nature's most beautiful designs. When one looks at the graceful coil of the frond of a fern, it is very easy to imagine that some early violin maker in fashioning the shape of the scroll of his instrument must have been a keen observer of the artistry of nature. Photograph by George A. Smith, Quarryville, Pa.

Unfortunately, Prof Bogomolets' theory seems to have been reported by others as an accomplished fact He himself did not claim that the serum had cured cancer or lengthened life In a report I saw, he wrote that he thought it could do this and perhaps much more But "could," in the sense of "might be able", is not the same as "does" or "has done"

In this same report it was stated that all work in his laboratory had been directed toward producing enough of the serum to meet the demands of the battlefield where Soviet physicians and surgeons found the serum useful in stimulating wound healing and the union of fractured bones

Other American scientists besides Dr Goldblatt have been studying the ACS serum At the University of Utah School of Medicine Drs Mark Nickerson, Thomas Burns and Arnold M. Cooper made a serum by injecting rabbits with rat spleen and bone marrow. They then tested its effect in stimulating wound healing

Up to the present time, skin cuts and broken bones did not heal any faster in

animals given the serum than in those without it However, these scientists do not think their results disprove the stimulating effects of the serum The reticuloendothelial system of a healthy animal is probably working at its maximum anyway, Dr Nickerson pointed out to me, so it is not surprising if it cannot be stimulated further Tests on animals weakened by chronic infection might show a different result

At the University of Texas at Galveston, Dr Charles M Pomerat and associates, Drs Ludwik Anigstein and Edward H Frieden, have studied the effect of ACS on cells growing outside the body as well as in the body and have made chemical studies in a search for the chemical nature of the active substance in the serum

In Los Angeles Dr Reuben Strauss has found that broken bones produced experimentally in rabbits form stronger, bigger calluses, which means they knit better, when ACS is given to the rabbits

Science News Letter, April 27, 1946

MEDICINE-CHEMISTRY

Medical Gas Masks

War research on toxic smokes should bring protection against flu, pneumonic plague, hay fever. Smokeless, dustless homes foreseen.

A FILTER, like those in modern gas masks, to protect hay fevervites from pollens, another such filter for protection against influenza, pneumonic plague and other air-borne diseases, homes free of smoke and dust—these benefits should come from war research on toxic smokes, or, as the layman would call them, poison gases, Dr W H Rodebush, of the University of Illinois, declared at the meeting of the National Academy of Sciences

"The modern gas mask," he declared, "is a practically perfect defense against poison gases and smokes which act on the nose, throat and lungs.

"It is without question due to this protection that chemical warfare was not used in World War II," he continued

World War I gas masks stopped poison gas with a dense bed of fine charcoal particles but the charcoal can not stop smoke That, Dr Rodebush explained, is why the blue cross shell became one of the most dreaded and effective weapons used by the Germans. It was filled with a sneeze gas in the form of a smoke Its particles went right through the charcoal and caused intense irritation of the nose

Several types of filters which were very effective in removing smoke without at the same time making it more difficult to breathe through the gas mask were developed by the aerosol section of the National Defense Research Committee, Dr Rodebush reported

"It is an interesting fact," he said "that most of the very toxic substances which have been suggested for use in future wars are aerosols and, insofar as they depend upon penetration of the respiratory tract for effect, the filter is an adequate protection

"The principles of filtration which have been studied are likely to prove of great use in civilian life It should be possible, for example, at small cost to remove all traces of smoke and dust from the air in our homes, thus enormously simplifying the problems of housecleaning and greatly increasing the comfort of breathing for the dwellers therein, particularly in our large cities where so much inconvenience and discomfort is caused by the smoke-laden air

"It would be neglecting an important part of the Aerosol Section work not to mention the insecticide aerosols, such as DDT It is an interesting fact that the most efficient insecticides are in the form of aerosols The reason for this is clear on a little thought A certain minimum dosage is required to kill the insect. If the insecticide is dispersed in droplets of the proper size in a cloud the insect cannot fly through the cloud without encountering one or more of the particles which are adsorbed through the body surface and prove fatal

"The aerosol cloud behaves as a fine meshed window screen with this difference In the screen the meshes must be smaller than the insect's body, but in the cloud one can easily make a statistically exact calculation of the size and dispersion of the cloud so that only a negligible percentage of the insects can fly through the cloud without coming in contact with enough of the droplets to give a toxic dose.

"It is, of course, possible to use a toxic gas to kill insects but it turns out that the gas concentrations required are far greater than are concentrations of aerosols

"A final mention must be made of the work on the dissipation of fog on landing fields The problem of landing a plane under conditions of low visibility is of course ultimately to be solved by radar, but this problem was a very serious one in World War II. No simple economical solution was reached on this problem Air conditioning the atmosphere is a job whose magnitude can be realized if one remembers that one cubic kilometer of air weighs 1,000,000 tons"

Science News Letter, April 27, 1946

Cedar paper containing DDT has been developed as a lining for clothes closets and storage chests to protect against moths and other insects.

SCIENCE NEWS LETTER

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ELECTRONICS

Pilots "Talked Down"

Regardless of weather, radar is able to "see" the plane as it approaches the landing field, and the operator sends complete instructions for landing.

See Front Cover

➤ WHEN "SOUPY" weather makes landing airplanes a dangerous operation, ground radar stations can give the pilot orders that bring him down on an airport runway safely

Demonstrating its ground controlled approach system to aviation writers at Banana River Naval Air Station in Florida, the Navy showed how pilots can be "talked down" when low visibility makes landing hazardous A close-up of sensitive radar equipment that records the position of planes above an airport, permitting operators of the equipment to "see" clearly, regardless of weather, and to systematize and control their landing approaches is shown on the front cover of this SCIENCE NEWS LETTER

Radar at the edge of the landing field follows the plane's maneuvers as a pilot approaches the landing field Able to "see" the plane as it appears clearly on the radar screen through the thickest fog, the radar operator sends the pilot complete instructions that bring his plane down on the runway to a perfect landing.

Ground controlled approach—GCA to Army and Navy flyers—was developed during the war and first sent into the field by the Armed Forces about November, 1944. Since then, the Navy says that simpler, more reliable and more easily operated equipment has been produced

On the ground, the GCA installation includes two complete radar sets, six radio transmitters and six receivers The whole unit is mounted in a trailer behind a four-ton truck

On the plane, no special equipment is required as the communicating is done via ordinary radio transmitters and receivers All the pilot has to do, Navy GCA enthusiasts emphasize, is to fly according to the directions given him

In addition to "talking down" the pilot from the ground, the control system protects him from collisions with radar warnings of any other aircraft in the vicinity.

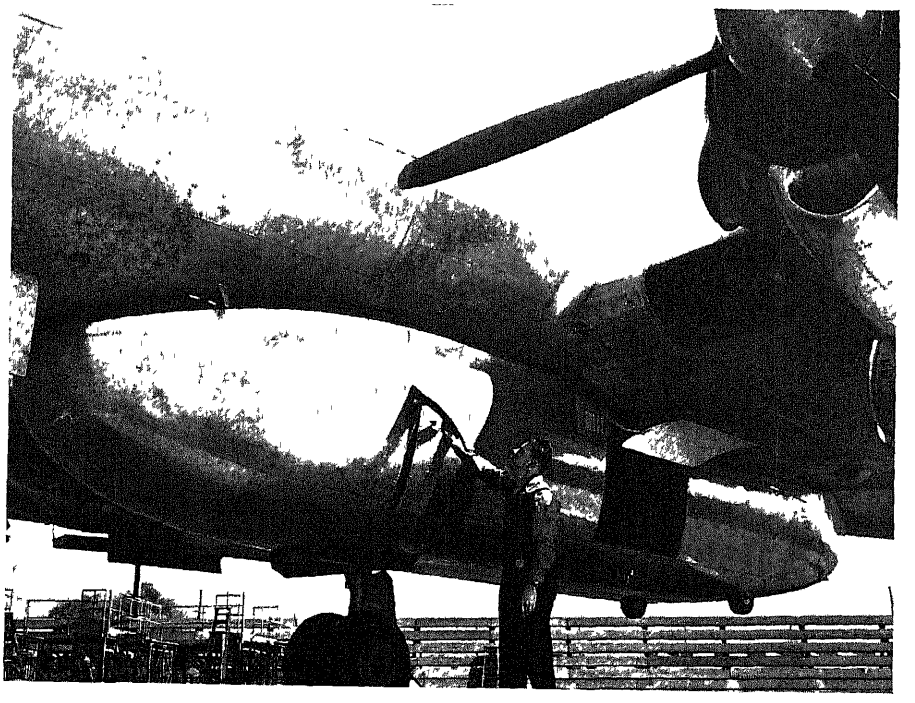
Original GCA specifications called for equipment that would bring the airplane safely down to 150 feet above the airport, but it can do better than that. The elevation beam used is accurate to six feet, while the azimuth beam is correct within 20 feet

With his safety hinging on the orders received from the ground, the pilot has to understand clearly his orders Strict and precise language is used by the pilot and the ground station, including such familiar air terms as "ROGER" for "Your message is received and understood," and "WILCO" for "Your message is received, understood and will be complied with"

To guide a pilot in, the orders are "Steer " followed by "right" or "left" and a magnetic heading, while altitudes are simply sent as "Fly at .. feet" With radar eyes to follow the plane, the ground station needs only these simple directions to bring a pilot down safely under "ceiling zero"

Basic GCA equipment was developed at the government-directed and supported radiation laboratory on the campus of the Massachusetts Institute of Technology, and this type of installation has been widely tested by the Navy, Army and the Civil Aeronautics Administration

Science News Letter, April 27, 1946



HEAVY LOAD—With a loaded Speedpak firmly attached to its fuselage, a Lockheed Constellation is given final check by a mechanic prior to flight. Water-tight sealing on the joint between the Speedpak and the Constellation fuselage prevents seepage of moisture in flight. A waterproof tarpaulin gives additional protection for the baggage compartment.

AERONAUTICS

Four-Ton Cargo Container For 1,500-Mile Flights

➤ SLEEK, streamlined all-metal cargo containers, that fit snugly to the undersides of the bodies of giant Constellation airliners and hold four tons of baggage each, have been developed and tested by the Lockheed Aircraft Corporation, builders of the Constellation The detachable container, called a Speedpak, can be attached to the belly of the fuselage in two minutes, or removed in the same brief time

The giant transport, with the loaded Speedpak attached, can be used for flights up to 1,500 miles Its speed is decreased by only about 10 miles an hour The plane's flight characteristics are not impaired. An important feature of the Speedpak is the ease with which ground

attendants can load and unload passenger baggage, thus decreasing long waits at airports A built-in electric hoist instantly lowers the Speedpak to convenient loading height, and as quickly raises it into position to be locked for flight

Science News Letter, April 27, 1946

MEDICINE

New Health Leads

Better treatment of filariasis and schistosomiasis and new knowledge of antimony are being gained by cooperative research.

➤ NEW LEADS to better treatment of filariasis and schistosomiasis, tropical diseases encountered by our troops in the Pacific theater of the war, and new knowledge of antimony, a chemical with both healing and poisoning properties, are being gained by cooperative research at the National Institute of Health and the Carnegie Institution of Washington

Results to date of these studies, started during the war and still continuing, were reported by Dr. Frederick J Brady, of the National Institute of Health, at a meeting of the Washington Philosophical Society.

The studies started with a search for better medicines to treat these two tropical diseases. One of them, filariasis, sometimes develops into the much dreaded elephantiasis.

In this search, 55 chemical compounds were tested Many of these were new, some were covered by German patents and others had been previously known and used Of the entire group, four were found more promising as remedies than fuadin, the antimony compound generally used to treat schistosomiasis However, the scientists found that any trivalent antimony compound was effective in treating these tropical diseases

The antimony compounds have two effects on the parasitic worms that cause filariasis: 1 They cause the microscopic worm embryos to disappear from the blood stream; 2 They sterilize the adult female worms which remain in the heart of the infected animal.

This has a bearing on treatment of the disease because hitherto scientists have held that treatment of filariasis in humans would bring on elephantiasis much faster than it would develop without treatment. According to this theory the antimony compound killed the female adult worms and the dead and dying worms in the lymph nodes caused the grotesque and disabling swellings know as elephantiasis. If the adult female worms are sterilized but not killed by the treatment, then the treatment should be effective in checking the disease and preventing elephantiasis

The action of antimony, though long used in medicine and familiar to the layman in the compound, tartar emetic, has never been fully known. Using antimony 124, a radioactive form of the metal made with the cyclotron at the Carnegie Institution, the scientists have gained new knowledge about this useful but poisonous chemical

Tartar emetic, made with radioactive antimony, has been given to rats, dogs and men. It leaves the blood stream very rapidly and, in dogs, almost half of it is concentrated in the liver

The thyroid gland, much to the scientists' surprise, also accumulates a large quantity of the antimony. Relatively small amounts stay in the lymph nodes and skin

The liver, it was discovered, changes the tartar emetic into a new antimony compound. This, rather than the tartar emetic, may be what is effective in permanently sterilizing adult female worms and killing off the embryonic forms in the blood stream

Whether this new compound has this remedial effect is not yet definitely known The scientists do know now that the new compound is soluble in water, is less poisonous than tartar emetic and is excreted from the body faster than tartar emetic They hope soon to be able to identify the new compound chemically

One atom bomb research by-product will be to give more information about the action of antimony in the body, Dr Brady said. Radioactive antimony made by cyclotron bombardment is not powerful enough for study by the tissue autographing technique

This is a method for exposing photographic plates to radiation from radioactive elements in microscopic sections of body tissues Examination of the sections shows the very cells of the body in which the radioactive chemical has been deposited.

When radioactive antimony becomes available from the pile used for uranium fission in atom bomb production, this technique can be used Scientists will then know which cells of the liver and thyroid, for example, accumulate antimony and from that may learn more of what happens to it in the body or what it does in the body to poison or cure

More knowledge of antimony and its use for curing schistosomiasis and filariasis is also expected from studies like those that developed BAL, the British anti-lewisite chemical that became a remedy for arsenic and mercury poisoning BAL itself may be used in this phase of the work which will involve study of body enzymes. Arsenic poisons by tying up sulfhydryl groups in enzymes and BAL saves the victim by overcoming this chemical linkage Antimony may similarly act through body enzymes

A remedy for antimony poisoning, similar to BAL for arsenic poisoning, could then be developed, or BAL itself might prove useful The importance of this lies in the fact that doctors must give antimony in close to poisoning doses to treat schistosomiasis effectively

Science News Letter, April 27, 1946

CHEMISTRY

Solid Nylon Sheeting Suitable for Handbags

➤ NYLON LINES of hoseless women throughout the nation seem to mean little to the Du Pont Company, they have announced the successful development of a nylon sheeting suitable for wallets, brief cases, handbags, seat covers and other articles customarily made of leather It raises the question. will a nylon handbag make a contented woman if her legs are still nylonless?

The new solid nylon sheeting is tough and durable in leather-like applications, can be made in any thickness and in various colors, and can be run through embossing rolls to give it any grain or other finish. It is made by the simple process of forcing the soft plastic material through a slot on a special machine into one continuous strip Perhaps before the nylon sheeting is available to the trade, nylon stockings will be plentiful, because the new sheeting still faces production problems, and manufacturing facilities must be constructed.

Science News Letter, April 27, 1946

Hollow-stemmed *grasses* are able to support a heavy head of grain due to tough, elastic fibers, and the sheathing base of leaves.

MEDICINE

Malaria Cure Announced

New drug, SN13276, permanently clears up the disease in white patients. Taken only once a week, it makes suppression in communities practicable.

➤ A POSITIVE cure for malaria exists It has been tested sufficiently to prove that it will permanently clear up the worst Southwest-Pacific type vivax malaria cases in white patients. Its value as a cure for malaria in Negroes, Chinese and other dark-skinned peoples must be further tested before it can be confidently used for their treatment

This announcement was made by Dr James A Shannon, director of the Squibb Institute for Medical Research, New Brunswick, N J, at the close of a special symposium on antimalarial drugs held in connection with the meeting of the American Chemical Society During the war Dr Shannon was chairman of the panel for clinical testing of antimalarial agents of the Board for Coordinated Studies, with headquarters in Washington, D C

The new drug, which was synthesized only during the past year, is still designated only by a number, SN13276 It is chemically related to a previously known drug, pamaquin, also called plasmochin in Germany This compound, first made about 20 years ago, had definite curative properties but it could not be used because it was too poisonous to the patients In particular, it caused severe anemia in the dark-skinned races by dissolving their red blood corpuscles The new malaria cure, whose molecular structure resembles that of pamaquin, but with modifications, is more effective against the malaria parasite, less toxic to human beings

Considerably more research needs to be done, Dr Shannon emphasized, before the new drug can be released for general medical use Of special importance is the need to make sure it will not have bad effects on Negroes, who are among the most afflicted groups in this country Important, too, is continued chemical search for related but still better drugs These researches are at present badly slowed down because the Office of Scientific Research and Development, which supported the work during the war, is closing down as of July 1, and no new agencies to continue the researches have yet been provided for. Legislation that would help was introduced many months ago, but Congress has not yet acted on it

Before the new curative drug had been developed, the wartime research teams that tackled the malaria problems had made notable contributions, Dr Shannon stated Before the end of 1943 they had rounded up information that showed synthetic atabrin to be superior to natural quinine as a malaria suppressant, and had also made possible the large-scale use of totaquine from cinchona bark, which was the only antimalarial drug available for civilian use during the war

A second and more important contribution was the development of new synthetics better than atabrine, which would effectively suppress malaria even if they could not cure it Two of these, chloroquin and oxychloroquin, can be taken in doses as much as 30 to 50 times the quantity needed to suppress malaria without causing distress to the patient They also do not cause the skin discoloration that atabrin does This makes it possible to keep down malaria by giving doses only once a week instead of once a day, as is necessary with atabrin

A once-a-week regimen, Dr Shannon pointed out, makes suppression of malaria in whole communities practicable, which is not the case with a drug that has to be swallowed once a day

New Malaria Drug

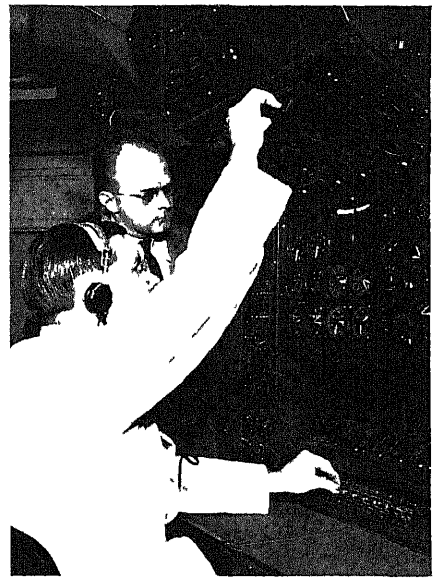
➤ EFFECTIVE antimalaria results may also come from a new group of synthetic chemical compounds known as the alpha-aminocresols, which were introduced to members of the American Chemical Society at their meeting in Atlantic City by a research team led by J H. Burckhalter of Parke, Davis and Company.

One compound in the group, tried on bird malaria in young chicks, has shown itself to be 75 times more effective than quinine, Mr. Burckhalter reported. Chicks usually take the place of guinea pigs in preliminary experiments on antimalarial drugs, because while bird malaria is not identical with the disease in man, it is enough like the human malarias to enable scientists to get at least an approximate range on new weapons in this warfare.

More than 2,000 different chemicals have been tested for possible use against malaria during the past 10 years in his laboratory, the speaker stated The alpha-aminocresol group has shown considerable promise, and more than 100 compounds belonging to it have already been tested

The chemists started with the simpler forms, having the least effectiveness, and proceeded to synthesize increasingly complex ones One of these complex, large-moleculed compounds gave the startlingly favorable results It makes the necessary differentiation between the malaria germ and its victim, killing the former without poisoning the latter. It also has the desirable quality of not staining the skin, as atabrin does.

Science News Letter, April 27, 1946



FLIGHT TEST—This portable flight engineer trainer duplicates the flight engineer's station in the Lockheed Constellation transport and enables student engineers to familiarize themselves with all aspects of their station without resorting to costly flight tests. The ground unit is also valuable in acquainting other crew members with the flight engineer's duties. Lighting effects and a loudspeaker reproduce the visual auditory aspects of flight.

Vegetable ivory is one of the best materials for buttons, it comes from the nuts of the jarina tree of the Amazon country which when ripe become hard as ivory and possess a similar durability

RADIO

Radar Developments To Be Told at Meeting

➤ DISCOVERIES in radar, radio wave propagation, and new radio apparatus developed during the war will be reported at meetings to be attended by radio scientists May 2 to 4 in Washington, D C

At these first postwar meetings of the American Section of the International Scientific Radio Union and the Washington Section of the Institute of Radio Engineers one session will be devoted to technical aspects of radar, while a day's time will be spent on the way in which radio waves travel in the upper atmosphere The meetings will be under the chairmanship of Dr J H Dellinger, chief of the National Bureau of Standards' Radio Section, who headed the Inter-Service Radio Propagation Laboratories during the war

Science News Letter, April 27, 1946

BIOCHEMISTRY

Plant Growth Regulators In Biological Warfare

➤ A HINT that 2,4-D or some close relatives of this new weed killer might have been used as agents of biological warfare appears in a report in *Science* (April 19)

During the war extensive tests on the use of these substances, called plant growth regulators, were conducted by the Special Projects Division of the Chemical Warfare Service at Camp Detrick, Md, the report states Such a statement, coming from this division where other biological warfare research was conducted, obviously implies that the use of these substances for destruction of enemy crops was at least considered.

The report gives further evidence of the peacetime benefits to be expected from biological and chemical warfare studies as well as of the wide range of scientific defenses needed in war.

Over 1,000 compounds were prepared and tested, the Special Projects Division now reports. The tests included effects on germinating seeds and on the growing plants when the compounds were applied to the leaves Studies of methods of using the compounds showed that a spray was the best

Originally the scientists thought they might find compounds that were specific for certain plant crops The advantages of this in warfare are obvious Against an enemy whose staple food crop was rice, a rice-specific compound, if found, would be used Against other nations a wheat-specific or a rye-specific compound might be useful

Compound-crop specificity was found only to a limited extent, the report states In general, the compounds were more poisonous to broadleaf plants than to grasses

One group of compounds was found which was more poisonous to cereals or grain crops such as rice, wheat, and rye, than to broadleaf plants. British scientists also found this true. The compounds are carbamic acid derivatives

Only one compound specific for broadleaf plants was found This one and its derivatives were very damaging to Irish potatoes. It is 2, 4, 5-trichlorophenoxyacetic acid, or 2, 4, 5-T for short

Plant growth regulators or hormones, such as 2,4-D and 2,4,5-T act by stimulating abnormal growth followed by death of the plant They are effective in very minute quantities

Results reported so far, remarkable as they have been, are not the whole story but "only the beginning," Dr. E. M. Hildebrand, of the Food Machinery Corp, Dunedin, Fla, states in another report on the weed killers appearing in the same issue of *Science*

Science News Letter, April 27, 1946

CHEMISTRY

Cousin of DDT Reported As More Effective

➤ DFDT, a chemical cousin of DDT, promises to be even more effective in man's chemical warfare against insects, Prof H L. Bradlow of the University of Kansas reported at the American Chemical Society meeting. In this compound, whose full chemical name is difluor-diphenyl-trichloro-ethane, fluorine atoms are substituted for two of the five chlorine atoms of DDT.

In identical tests on caged insects, DDT killed 90% to 95%, while DFDT killed them all. It also lasts longer when used as a soil insecticide. It is less toxic to warm-blooded animals—an advantage when used about the home and in the barn.

First information about DFDT was obtained from scattered German references. Before long, Prof Bradlow had succeeded in producing it in his own laboratory. At present, he stated, it is somewhat more expensive than DDT

"By further modification of the basic DDT structure," he added, "we are hopeful of producing even more potent compounds."

Science News Letter, April 27, 1946

IN SCIENCE

GENETICS

Heredity Units Act as Models for New Molecules

➤ WHEN WE SPEAK of a boy as "an absolute copy of his father," we have scientific warrant for doing so For the genes, or invisible hereditary units, which he received from his father have acted as models for the chemical construction of every molecule of living substance in his body, as a pattern or templet serves as the model for a mechanic turning out identical piece after piece on his lathe or workbench

This picture of the function of genes was presented to the American Philosophical Society by Prof G. W Beadle of Stanford University, in the course of the annual Penrose Memorial Lecture.

Studies of the sub-units in the construction of living things taught us that the one thing that really distinguishes them from non-living things is their power of self-duplication, Prof Beadle stated First we learned that cells can produce new cells, each a close copy of the original, though it may later become modified for special functions differing from that of its parent cell Then we learned that units much smaller than cells—genes and virus particles—possess similar powers of self-duplication

In the growth of the organism from its original single cell, genes apparently serve as copies for most if not all protein or protein-containing molecules, Prof. Beadle told his audience Such molecules may later become regular structural units in the new organism's body, or they may turn into such specialized things as the enzymes that chemically control such important functions as respiration and nutrition, or the antigens that combat bacterial poisoning Since enzymes, antigens and similar key compounds influence the whole course of life, the genes, operating through them, exercise a mighty control over all organisms, from minute one-celled forms up to whales and redwood trees

"There appear to be no obvious reasons," said Prof Beadle in conclusion, "for believing that genes have any function other than that of serving as templets for the construction of complex protein molecules"

Science News Letter, April 27, 1946

E FIELDS

NUTRITION

B_6 Needed to Utilize Protein for Good Health

➤ WITHOUT an adequate supply of pyridoxine, also known as vitamin B_6, the animal body cannot utilize proteins which are indispensable to good health, University of California experiments show

The studies show that a high protein diet, which is often prescribed to build the body's resistance to disease, may be useless unless it accompanies a high intake of pyridoxine to enable the body to assimilate the protein

In experiments with animals it has been shown that tryptophane, an indispensable amino acid found in protein, is not utilized by the body but is excreted when there is either a severe or moderate deficiency of the vitamin.

An extreme deficiency of pyridoxine is known to cause convulsions and severe anemia in animals Feeding of tryptophane to the severely deficient animals aggravated these symptoms and also produced nausea and muscular weakness.

Even in moderately deficient animals the same symptoms were produced, though after a longer period of time Animals fed an adequate supply of pyridoxine were able to assimilate tryptophane, and showed no ill effects

The experiments were conducted by Dr Samuel Lepkovsky, Dr. Agnes Fay Morgan, and Helen E. Axelrod.

Science News Letter, April 27, 1946

PHYSICS

Peacetime Atomic Plant Is Obvious Development

➤ MOST SCIENTISTS not in the confidence of the Manhattan Engineer (Gen Groves and the atomic bomb outfit) must have assumed that under the cloak of secrecy an experimental plant for the peacetime development of atomic energy had been underway for many months

It is nine months since the first atomic bomb was exploded and the Smyth report was written. That should have been long enough to give birth to the rather obvious pilot plant that Gen Groves is reported to have told Sen McKellar (D Tenn.), is only now being begun.

Power production in competition with fuels and water power is the least important application of atomic energy

The atomic pile planned at Oak Ridge, Tenn , can be a factory for radioactive atom varieties, called isotopes, that, used as tracers in chemical, biological and medical experiments, may very well explain the way the green leaf uses sunshine, the cause of cancer and a host of other diseases

Use of these radioelements has been likened in importance to the discovery of the microscope

Most obvious application of atomic power is to the propulsion of large naval craft The Navy would be willing to pay almost any price for a ship that would not have to refuel for many months, and large ships could afford to carry the heavy weight of the protective materials blanking out powerful radiations given off by the atom splitting in atomic power plants It is surprising that the Navy is not hard at work on this possibility Even if the Manhattan District is in the Army it should be willing to cooperate

Less secrecy would allow the public to know whether the immense possibilities of atomic energy are being developed as fast as they could be.

Science News Letter, April 27, 1946

RADIO

Peacetime Uses for Panoramic Screen

➤ A PANORAMIC SCREEN that shows all radio signals received on a wave band at one time will find many important peacetime uses after playing an important role in the war, according to its inventor, Dr Marcel Wallace, president of the Panoramic Radio Corporation in New York.

Dr Wallace said the panoramic technique can be used for all-weather flying and ship handling, prevention of sea and air collisions and a multitude of other navigational and communication applications

He described panoramic technique as being diametrically opposed to normal radio reception Instead of blocking out all but one signal, the panoramic technique scans an entire wave band and reports all signals simultaneously on the panoramic screen, he explained

Invented before the war, the new system of radio reception was used by the armed forces to jam enemy radar, monitor enemy broadcasts and locate off-frequency transmissions, the inventor disclosed

Science News Letter, April 27, 1946

PHYSICS

X-ray for Cancer Without Radiation Sickness

➤ EFFECTIVE penetrating X-ray treatments for cancer and other ills without the patient suffering radiation sickness is possible through the use of a 20,000,000 volt betatron "atom smasher", Dr D W Kerst, professor of physics of the University of Illinois, declared in delivering at the Ohio State University the first of his national Sigma Xi lectures

With ordinary X-ray machines the distribution of the radiation is different, whereas Dr Kerst declared with cross-firing with betatron-induced X-rays it would not be necessary to curtail an X-ray treatment because of radiation sickness produced in a patient

Dr Kerst, who is inventor of the betatron, said construction of an atom-smashing betatron of 250,000,000 electron volts would make possible the production of pairs of mesons, atomic particles created hitherto only by cosmic rays from outer space

A 100,000,000 electron volt betatron at Schenectady, N Y., has already been used to produce artificially single mesons, but Dr. Kerst explained that if both positive and negative mesons in pairs could be manufactured there would be important opportunities of further exploration of atomic mysteries

Development of the betatron during the war, Dr Kerst explained, was concentrated upon types that could take radiographic photographs through more than a foot thickness of steel in order to detect flaws in armor plate and large machinery parts Using a fast technique, pictures have been taken through 20 inches of steel in 18 minues

Science News Letter, April 27, 1946

CHEMISTRY

Liquid Oxygen Useful At High Altitudes

➤ LIQUID OXYGEN, part of the fuel system of the Nazis' V-2 rocket-bombs, was proposed for use in airplanes by Dr. H. Grayson-Smith of the University of Toronto at the American Chemical Society But it is for the use of the passenger at high altitudes rather than for the engines. Bottles of the liquid breath of life, together with apparatus for restoring it to a gaseous state, can be substituted for the thick-walled tanks of compressed oxygen now in use, with considerable savings in weight, he declared.

Science News Letter, April 27, 1946

ASTRONOMY

Venus Still Brightening

Easily seen during May evenings are all of the planets that are ever visible to the naked eye, with the exception of Mercury. Partial eclipse visible in South Pacific.

By JAMES STOKLEY

➤ THE BRILLIANT display of planets is still with us, for during May evenings every one that is ever visible to the naked eye, with the exception of elusive Mercury, is easily seen All four are shown on the accompanying maps, in which is depicted the sky at 10·00 p m. on May 1, and 9:00 p m. in the middle of the month.

Venus, brightest of the quartet, barely gets on the map, and is shown on the horizon in the west, in the constellation of Taurus, the bull. Most of this figure, by the time for which the maps are drawn, is out of sight At sunset, however, Venus is about 20 degrees above the horizon, so it is easily seen as the sky darkens Its magnitude, on the astronomer's scale, is minus 3.3

The second most brilliant planet at present (which Venus exceeds about three and two-thirds times) is Jupiter, high in the south in the constellation of Virgo, the Virgin, close to the star Spica. Jupiter's magnitude is minus 1 9

Saturn Is Third

Saturn, most distant naked-eye planet, is toward the west, in Gemini, the twins, where it has been for recent months. Ranking third in order of present brightness, it is of magnitude 0 4, or about an eighth as bright as Jupiter. This is about two and a quarter times as bright as the fourth and faintest of our planets, which is Mars It has now moved from the figure of Gemini, where it stood during the winter and early spring, and is sojourning in the next-door constellation of Cancer, the crab

Of the stars (which, unlike the planets, are distant suns, shining with their own light) now visible, the brightest is Vega, in lyra, the lyre, seen in the northeast It is a little brighter than Saturn Then comes Capella, in Auriga, the charioteer, in the northwest and rather low, Arcturus, in Bootes, the bear driver, is high in the south Next comes Procyon, in Canis Minor, low in the west, and then Spica, in Virgo, the virgin, already mentioned because of the proximity of Jupiter

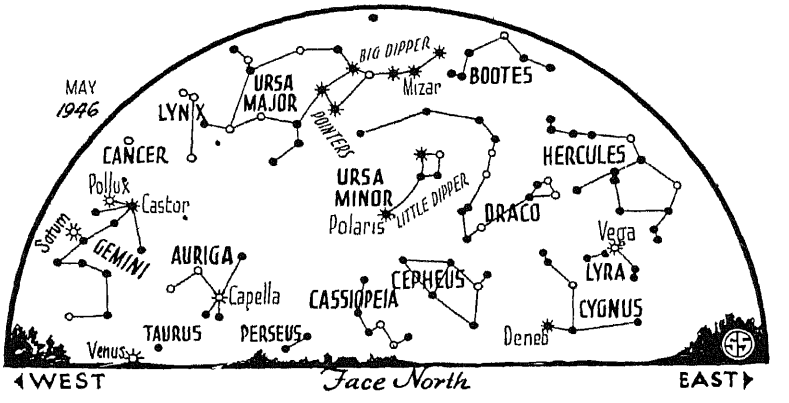
Low in the northeast, Scorpius, the scorpion, can be seen partly visible above the horizon, and in it is Antares, very red in color Later in the night, as in the evenings of summer, it is in a better position, and its brilliance can better be appreciated The same thing is true of Cygnus, the swan, just appearing in the northeast, and in which Deneb shines

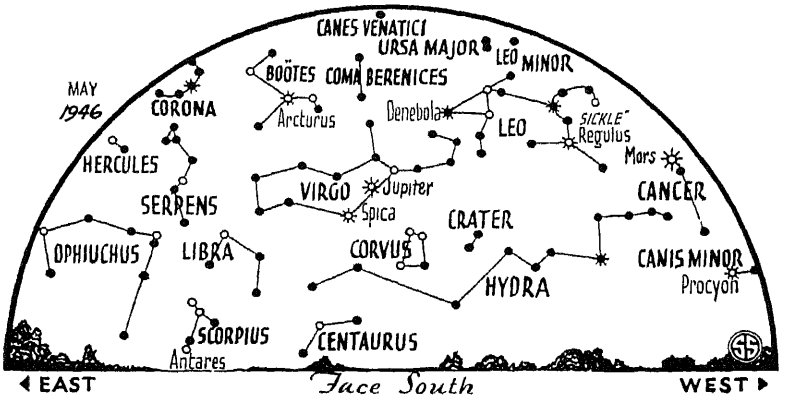
Regulus, in Leo, the lion, is in a good position, high in the southwestern sky. Directly west, one of the few typical constellations of the winter evening still visible, is the group of stars marking Gemini, the twins Pollux is the brightest star.

Though it contains no stars of the first magnitude, the Great Dipper, in Ursa Major, the great bear, is perhaps the best known of all star groups At this time of year, even though it is upside down, it is in its best evening position, high in the north The two stars toward the west, forming part of the dipper's bowl, are the pointers, which indicate the direction of Polaris, the pole star, below Polaris, in turn, is at the end of the handle of the little dipper Winding around it is the long and snaky Draco, the dragon

During May, the sun continues to move farther and farther north, approaching its maximum in June, at the beginning of summer On May 30, the moon will come partially between the sun and earth, producing a partial solar eclipse, but few people will see it, as the region of visibility is in the South Pacific, between New Zealand and the southern part of South America. Except for a few Pacific islands, the only land where it will be visible is Chile, and there it will begin just before the sun sets, partially eclipsed In mid-Pacific, where it is at a maximum, about 89% of the sun's diameter will be hidden.

Though most people probably picture an astronomer at work as a man looking





☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

through a telescope, a visit to a great observatory will reveal relatively few persons at such a task One is more apt to find the astronomer examining a photographic plate, for most of modern astronomy is done by photography This has two advantages First of all, the plate is a permanent record that can be studied at leisure But even more important is the fact that it will soak up light with long exposures It is therefore possible to photograph objects like faint nebulae, that cannot be seen even when looking through the biggest instruments Again, with properly sensitized plates, exposures may be made with ultraviolet or infrared rays, which cannot be detected by the human eye

Electronic Techniques

Now, as a result of wartime electronic developments, it is likely that electron tubes, oscilloscopes and other instruments that one expects to find in an electrical laboratory will more and more invade the observatory As a matter of fact, even before the war astronomers had begun to use several electronic techniques To measure brightness of stars they used the electric eye, or photocell, attached to a telescope. This is an electronic tube in which the electrons are knocked out of a sensitive surface by light. The more light, the greater the number of electrons Thus, by measuring the resultant electrical current, which is a flow of electrons, the amount of light from the star could be determined Sometimes photocells are also used to study photographic plates, particularly those of the spectra of stars, where dark lines indicate certain elements, under various conditions Important to know are such data as the relative intensity of different lines, or whether a line is sharply defined or gradually fades out on each side

With the microphotometer, a spectrum plate is moved past a narrow slit, parallel to the lines A light shines through the slit, to a photocell beyond, and as the dark lines go by the current from it is reduced This varying current may be made to write its own record, a curve with valleys and peaks which show clearly the characteristics of the lines in the spectrum plate

Television, too, may become an adjunct of astronomy Just before the war experiments showed that the sun's corona or outermost layer, formerly visible only at the time of a total eclipse, could be observed at other times with a television method. Perhaps television camera tubes may be made which are even more sensitive to light than the best photographic plate, and these may be employed in telescopes in their place With other electronic tubes to amplify the faint currents, stars and nebulae far fainter than we can photograph today with the biggest instruments may be studied If this is done, it may be possible that a telescope of only moderate size will do what the 100-inch reflector at Mt Wilson, or the new 200-inch at Mt Palomar, will do by methods which are conventional today But the same improvements should also make those telescopes even more potent—able to equal the work of ones far bigger than any that have yet been proposed

Then there is the possibility of using radar in astronomy, as suggested by the success of the Signal Corps in getting reflections of radio waves from the moon. This would give immediately the moon's distance To obtain it otherwise requires photographs made at different parts of the world, and their careful measurement and comparison The same method might also be used for the measurement of distances of the planets, but the problem in that case is much more severe While the moon's average distance is of the order of 240,000 miles, Venus, which comes nearer than any other planet, reaches a minimum distance of 26,000,000 miles The strength of a radar echo varies not with the distance of the object which sends back the reflection, but with its fourth power (This is the distance times the distance, times the distance, times the distance) Thus, while Venus, at her closest, is only 108 times as far as the moon, the echo would be reduced by a factor of the fourth power of 108, which is more than 136,000,000!

Still more unlikely is the possibility of charting the heights of lunar and planetary features by radar The radar beam used in the army experiments was several times the diameter of the moon at the distance of our satellite To be useful in measuring height of lunar mountains (which can, by the way, be measured accurately now by other methods) the beam would have to be of the order of a mile or less in diameter at that distance In the case of Venus, which is continually covered with clouds, such height-finding methods would be very useful, but the problem of getting a beam a mile in diameter at 26,000,000 miles or more is far more difficult—indeed, with present-day knowledge it seems to be well beyond the bounds of practicability.

Celestial Time Table for May

May	EST	
1	8 16 a m	New moon
2	1 00 a m	Moon nearest, distance 222,500 miles
	9 30 p m	Moon passes Venus
4	early a m	Meteors of eta Aquarid shower visible
6	12 02 a m	Moon passes Saturn
7	5 04 a m	Moon passes Mars
8	12 13 a m	Moon in first quarter
12	7 40 p m	Moon passes Jupiter
15	9 52 p m	Full moon
16	2 00 p m	Moon farthest, distance 252,400 miles
23	11 02 p m	Moon in last quarter
30	11 00 a m	Moon nearest, distance 222,100 miles
	4 00 p m	New moon, partial eclipse of sun visible in South Pacific

Subtract one hour for CST, two hours for MST, and three for PST

Science News Letter, April 27, 1946

GENERAL SCIENCE

80-Year-Old Soviet Scientist Honored

➤ SOVIET agricultural scientists are honoring Academician Dmitri Pryanishnikov, now 80, who has spent 60 years in agricultural chemical researches, publishing over 400 scientific papers. His plan for crop rotation and use of industrial fertilizers, such as saltpeter and ammonium nitrate, combined with peat, industrial and farm wastes are credited with increasing crop yields and fertility of fields

Science News Letter, April 27, 1946

Approximately 90% of the casualties due to *lightning* occur in rural districts

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In China many persons have *pet birds* that they take out in their cages daily for an airing as regularly as Americans take their dogs out on a leash

Carnations were popular in Europe during past centuries because of their beauty and also because they were thought to have healing properties

The African *chameleon* can keep one eye focussed on a fly ahead of him that he is stalking, while he turns the other to observe a potential enemy off to one side.

American *chemicals* are now shipped to practically every important country, particularly industrial compounds, refrigerants, insecticides, fertilizers, paints, plastics and medicinals

German bread, coated with a 50% water emulsion of polyvinyl acetate containing various proportions of chalk, talc, and lithopene, showed only slight signs of interior mold growth after eight months

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GENERAL SCIENCE

International Studies

Large-scale laboratories for astronomy, health, food, marine biology and nuclear energy as part of UNESCO program urged by Dr. Shapley.

➤ INTERNATIONAL, large-scale scientific institutions for research and development in various fields were proposed by Dr Harlow Shapley, director of the Harvard College Observatory and president of Science Service

Dr. Shapley discussed the program of the United Nations Educational, Scientific and Cultural Organization as a guest of Watson Davis, director of Science Service, on Adventures in Science heard over the Columbia network

Calling on UNESCO to consider the possibilities of establishing international centers for scientific studies, Dr Shapley suggested large-scale laboratories for astronomy, health, food, marine biology and nuclear energy

He declared that the plutonium atom fissions just the same way in whatever nation it happens to be located, and reported that astronomers continued to exchange data with Nazi observers during the war

"Whenever the military men and the political powers that be don't interfere, scientists can get togther despite barriers of language, space and different government," Dr Shapley said.

Referring to UNESCO, he declared, "There has been good cooperation in many scientific fields in the past, but we are on the threshold of much greater cooperation."

The Harvard astronomer urged the UNESCO Preparatory Commission to consider the establishment of international science centers such as the "Copernician Memorial Observatory," for which he first outlined plans in 1944

"Equipment for modest researches and for instruction should of course be maintained in all countries, but great observatories are expensive, and their locations should be carefully chosen," he pointed out

He reported that the proposed international observatory plans had been heartily endorsed by astronomers of many countries at the International Astronomical Union meetings in Copenhagen, Denmark, several weeks ago

For medical research, he suggested a "Pasteur International Health Research Institute," while an "International Center for New Food Plants" would have experiment stations strategically located throughout the world

Dr Shapley said an "International Marine Biological Station" might be modeled on the one at Naples, Italy, and there should be an "International Center for the Study of Nuclear Energy"

"If a million dollars a year could be spent by UNESCO in building up these international enterprises, and within a few years three or four million dollars a year be spent in maintaining their useful and ever expanding international services," he declared, "the future of UNESCO as a great contributor to world peace would be assured."

Science News Letter, April 27, 1946

ENGINEERING

Air-Conditioner For High-Speed Planes

➤ YESTERDAY our fighting pilots flew their planes at 400 miles an hour, tomorrow we shall be riding as passengers at similar speeds. Taking outside air into plane cabins at such a gait is no simple matter of using an open air-scoop, states Waldemar F Mayer of Los Angeles, in his preamble to patent 2,398,655. At 400-mile speeds, air "rams" and becomes too hot for human comfort He accordingly places an air-driven turbine in the throat of his air intake, and uses the power thus picked up to drive a refrigerating system which in turn cools the air

Science News Letter, April 27, 1946

THE SCIENTIST IN ACTION by W. H. GEORGE

A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking, CLEAR thinking, THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS

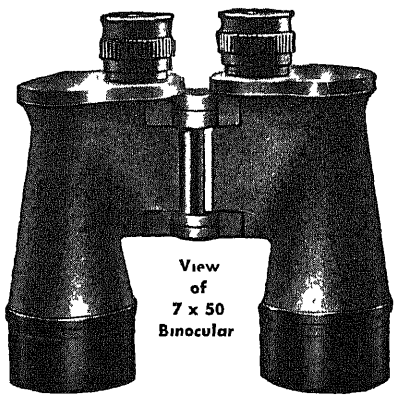
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ECOLOGY

NATURE RAMBLINGS

by Frank Thone



Woodland Sunshine

➤ SPRING FLOWERS in the woods are not altogether woodland flowers We commonly think of the woods as shady places, well covered by the interlacing twigs and overlapping leaves of the tree canopy. This they are, from late spring until the leaves drop off in autumn; but during late April and through much of May, in middle and northern latitudes, the trees are either unfoliaged or at most small-leaved during the time the violets, buttercups, fawn-lilies, anemonellas, spring-beauties and other typically vernal flowers are in bloom

During this time the forest is quite a different place from what it will be when the green canopy closes The trees' branches do cast a thin shade, and to some extent break the full sweep of the winds, but even so, there is much less difference between conditions in the woods and in the open than there will be later.

Both the quantity and the quality of the light under the unleaved trees are different. Total sunlight is several times more intense, which means among other things that the direct warming effect on soil is much greater, with correspondingly greater stimulus of perennial plants to grow and flower There is a higher proportion of rays of shorter wavelength, which are almost wholly cut off by the leaves, after these have had time to reach full development.

The lack of a leafy canopy also makes a considerable difference in the type of rainfall received by the forest floor In spring, the raindrops fall through the branches to the ground, with very little interception After the trees have spread their leafy umbrellas, light showers are intercepted partly or even altogether, and evaporated back into the air without moistening the soil at all Only heavier rains penetrate the canopy and reach the soil.

Of very great importance, perhaps of the greatest importance, is the difference in evaporation rates between the early spring woods and the same woods later in the season The same early sunshine warmth that encourages the flowers also speeds up transpiration losses through their leaves, and direct evaporation of water from the soil. Added to this, and boosting the effect significantly, is the freer sweep of the spring winds that carry off the water vapor thus produced Actual instrumental measurements of evaporation rates show little difference between the forest and the open at first, but after the canopy has closed the evaporation rate in the woods drops to half that in the open, or even less

Science News Letter, April 27, 1946

The adoption of *standard time* in the United States can be credited largely to the railroads; in 1883 more than 60 different local times used by the different railroads were resolved into the four standard times now used.

ELECTRONICS

Clearer Television Pictures Predicted

➤ THREE TIMES greater clarity and brilliance of images on a television screen are reported to result from a new coating applied inside the face of a cathode ray tube developed in Schenectady, N. Y

An aluminum "skin" or sheath serves as a sieve to electrons but is impenetrable to light, according to General Electric Co. engineers who designed the tube This special coating is 1,500 times thinner than a sheet of paper, but has a shiny surface reflecting light.

Coated on fluorescent powder just inside the face of the tube, the "skin" permits a beam of electrons shot from the rear of the tube to penetrate it The reflected light is believed to be three times greater than previously possible with this type of tube.

The thin coating of aluminum is applied by evaporating it so that it condenses on a plastic surface on the fluorescent powder in the tube. The plastic is removed during the heating treatment of the tube leaving the thin coat of aluminum

Science News Letter, April 27, 1946

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• Books of the Week •

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ANNUAL REPORT OF THE DIRECTOR OF THE MINT For the Fiscal Year Ended June 30, 1945—*Government Printing Office*, 97 p, tables, 20 cents

ARCHAEOLOGY OF THE UPPER RIO GRANDE BASIN IN SOUTHERN COLORADO AND NORTHERN NEW MEXICO—E B Renaud—*Univ of Denver*, 44 p, 65 cents Archaeological Series, Sixth paper

ASTRONOMY—John Charles Duncan—*Harper*, 500 p, tables and illus, $4 50, 4th ed A textbook suitable for beginning classes in astronomy, revised and brought up-to-date

CARNEGIE INSTITUTION OF WASHINGTON, YEAR BOOK No 44 July 1, 1944—June 30, 1945—*Carnegie Inst.*, 196 p, tables, paper, $1, cloth, $1 50

THE CAVENDISH LABORATORY—Alexander Wood—*Cambridge Univ Press*, 59 p, illus, $1 A description of the foundation and development of the Cavendish under Clerk Maxwell, Rayleigh, J J Thomson, and Rutherford, and some of the epoch-making work done there

THE CRIME OF IMPRISONMENT—George Bernard Shaw—*Philosophical Library*, 125 p, illus, $2 A now famous essay, written after the last war in behalf of the British Labor Research Office to revise the common system of imprisonment, is being published for the first time in book form

THE EFFICIENT USE OF FUEL—*Chemical Publishing Co*, 807 p, tables and illus, $8 50 The composition and properties of fuel, the theories and principles of combustion, and the equipment used in burning all types of fuel, such as coal and other solid fuels, fuel oil, and industrial gases A textbook prepared under the direction of the Education Sub-committee of the Fuel Efficiency Committee of the British Ministry of Fuel and Power

ELECTRONIC EQUIPMENT AND ACCESSORIES—R C Walker—*Chemical Publishing Co*, 393 p, tables and illus, $6 Principles of electronics and their applications in industry

EOCENE FAUNAS FROM THE DEPARTMENT OF BOLIVAR, COLUMBIA— Bruce L Clark and J Wyatt Durham—*Geological Soc of America*, 126 p, map and illus, $1 75 The Geological Society of America, Memoir 16

FOR A STRONGER CONGRESS—Philip S Broughton—*Public Affairs Committee*, 32 p, illus, 10 cents. Proposals for the reform of Congress, based on the theory that the main job of Congress should be to determine policy, to authorize adequate administrative organization, and to review and control the administration of policy Public Affairs Pamphlet No 116

INTRODUCTORY COLLEGE CHEMISTRY—Harry N Holmes—*Macmillan*, 590 p, tables and diagrs, $3 75, 4th ed A text of full college grade, yet adapted to the needs of students who have had no previous training in chemistry.

LUMINOUS TUBE LIGHTING—Henry A Miller—*Chemical Publishing Co*, 143 p, tables and illus, $3 50 An explanation of the underlying principles of the luminous tube, of the materials and equipment involved, and a description of each of the discharge tube light sources

MAP OF INDIA AND BURMA—*National Geographic Society*, paper, 50 cents, linen, $1, A new ten-color map of India, Burma, and adjacent regions of Asia, delineating natural features, cities and towns, and transportation lines, the 598 political divisions of India are outlined on a special chart on the back

THE OXFORD WAR ATLAS, vol IV The War in 1944—Jasper H Stembridge—*Oxford*, maps, $1 50

PLASTICS The Story of an Industry—*Society of the Plastics Industry*, 36 p, illus, free A non-technical yet comprehensive picture of the plastics industry and its many and widely differing products Copies may be obtained from the Society of the Plastics Industry, 295 Madison Ave, New York 17

POSTWAR PLANNING CONFERENCE FOR CONTROLLED SURVEYING AND MAPPING—*Texas Engineering Experiment Station*, 66 p, diagrs and map, single copies, free Bulletin of the Agricultural and Mechanical College of Texas, No 86

1945-1946 REPORT ON THE 27 0074-DAY CYCLE IN WASHINGTON PRECIPITATION—C G Abbot—*Smithsonian Inst*, 2 p, tables, 5 cents Smithsonian Miscellaneous Collections, Vol 104, No 21

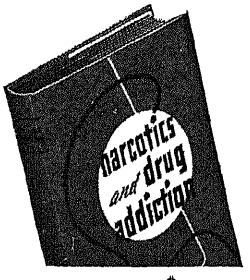
THE SOCIAL CULTURE OF THE NUNIVAK ESKIMO—Margaret Lantis—*American Philosophical Society*, 323 p, tables and illus, $2 50 Transactions of the American Philosophical Society, Vol 35, Part 3

SURGICAL TREATMENT OF THE NERVOUS SYSTEM—Frederic W Bancroft and Cobb Pilcher, editors—*Lippincott*, 534 p, illus, $18 Cranial and intracranial surgery, tumors, epilepsy and cranial nerve disorders, spinal cord, autonomic nervous system, peripheral nerves

TRIUMPH CLEAR—Lorraine Beim—*Harcourt*, 200 p, $2 A novel based on the remarkable work done at The Warm Springs Foundation among the infantile paralysis victims

THE WORK OF THE CARNEGIE AND SUGGESTIONS FOR FUTURE SCIENTIFIC CRUISES Oceanography—IV—*Carnegie Inst of Washington*, 111 p, tables and illus, paper, $1 50, cloth, $2 Scientific results of Cruise VII of the Carnegie during 1928-1929 under Command of Capt J P Ault Carnegie Inst of Washington Publication 571

Science News Letter, April 27, 1946



Just Published $3.75

NARCOTICS AND DRUG ADDICTION

By ERICH HESSE, M. D.

An up-to-the-minute survey of the immense quantities of narcotics and stimulants thrown on the world market through channels legal and illegal.

Narcotics and stimulants are clearly analyzed and described, according to their psychic and physical effects.

This book further endeavors to convey a pharmacological and toxicological knowledge, as well as to outline the general medical significance of narcotics and stimulants.

The drug addict is investigated in various case histories, experiments and tests on human beings as well as on animals are cited

The common components, the manner and method of preparation, are clearly defined, as well as the various stages of the multiple types of addiction, their effects and their cure.

An appendix contains name and subject index, and an extensive bibliography.

Among the Subjects Discussed

Narcotics and Stimulants
Pharmaceutical Opiates
Alcoholic Beverages
Traffic Accidents
Tea and Coffee
Cola and Cocoa
Marihuana and Tobacco Intoxication
Pharmacology of Nicotine
Opium and Morphine
Coca Leaves and Cocaine
Spruce and Cactus Narcotics
Hashish and Kava-Kava
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•New Machines And Gadgets•

⚙ *FOUNTAIN PEN, with what is called a magic sphere point that rolls the ink on dry, can be used for some 40 hours of straight writing without refilling, it is claimed It is reloaded with a cartridge, about 15 seconds being required. Cartridges with four different colored inks will be available.*

Science News Letter, April 27, 1946

⚙ *OXYGEN INDICATOR, to detect and measure tiny quantities of oxygen impurities in other gases such as carbon dioxide and hydrogen, is attached to a gas line and continuously indicates in percentages on a galvanometer oxygen impurities up to one part in a million Its hidden vital center is a precious metal catalyst*

Science News Letter, April 27, 1946

⚙ *RECTIFIER for converting alternating into direct current consists of a metal container inside of which a mineral element, selenium, is suspended in oil. The container is heavily tin plated and the whole unit hermetically sealed It works efficiently in boiling water or packed in ice, it is claimed.*

Science News Letter, April 27, 1946

⚙ *PARASOL to carry on the head instead of by hand has a headgear on its center rod in place of the ordinary ornamental handle The head-gear fits over the head like a visored open cap, a chin strap holds it firmly in place When the parasol is closed, the head-gear is within the folded cover*

Science News Letter, April 27, 1946



⚙ *LINE-THROWING gun, developed for the U. S. Merchant Marine, for life-saving, shoots a nylon line 400 yards from the reel shown in the picture A projectile sometimes used is one with a mechanism for firing a carbon-dioxide cartridge which inflates a float upon impact with the water.*

Science News Letter, April 27, 1946

⚙ *TRUE AIR-SPEED indicator basically consists of three separate units, air-speed indicator, altimeter and air thermometer, combined in one inter-acting assembly The pilot merely reads the true speed on a dial, all computations being made automatically by the instrument*

Science News Letter, April 27, 1946

⚙ *CONCENTRATED arc lamp, whose luminescent source may be as small as 0.003 inch and 1/16 as bright as the sun, has permanent electrodes sealed into a glass bulb, filled with an inert gas. The light-source is a circular spot which forms on a specially prepared zirconium oxide cathode It is usable for microscope-illumination, ultraviolet radiation, photographic printing and as a lenseless projector.*

Science News Letter, April 27, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 308

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Question Box

AERONAUTICS

What is a Speedpak? p 261

ASTRONOMY

What planets are visible during May evenings? p 266.

CHEMISTRY

What insecticide may be more effective than DDT? p 264

CHEMISTRY-MEDICINE

How may toxic smoke research during the war aid medicine? p 260

ELECTRONICS

How are pilots "talked down" regardless of weather conditions? p 261

How may clearer television pictures be possible? p 270

GENERAL SCIENCE

What additional undertaking does Dr Shapley urge UNESCO to consider? p 268

MEDICINE

What drug has been called a positive malaria cure? p 263

What is ACS serum? p 259

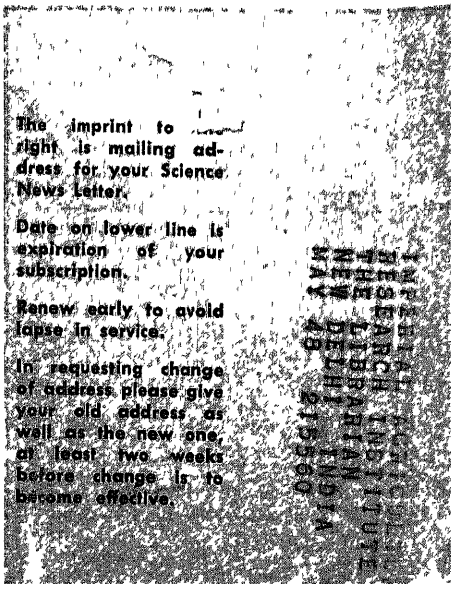
NUTRITION

What vitamin is needed by the animal body in order to utilize protein? p 265

PHYSICS

What may make X-ray treatment of cancer without radiation sickness possible? p 265

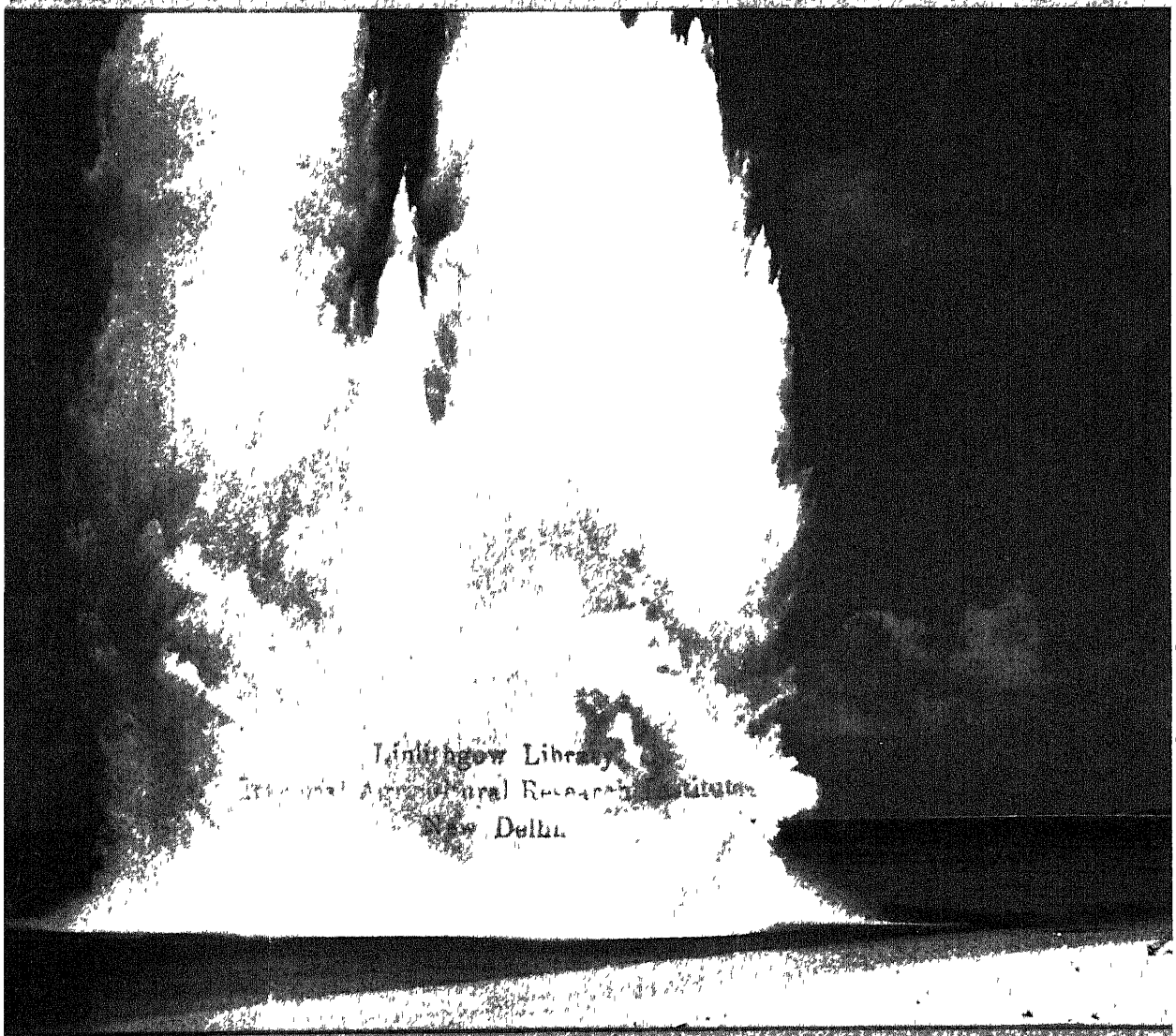
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ENCE NEWS LETTER

Vol. 49, No. 18

WEEKLY SUMMARY OF CURRENT SCIENCE • MAY 4, 1946



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For Atom Test

See Page 274

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946

GENERAL SCIENCE

National Academy Elects

Twenty-nine distinguished American men of science, two Foreign Associates have been elected to the National Academy of Sciences.

➤ RUSSIA'S best-known physicist, Dr Peter Leonidovich Kapitza, noted for his researches on intense magnetic fields, was elected as one of two Foreign Associates at the spring meeting of the National Academy of Sciences He is director of the Institute for Physical Problems of the Academy of Sciences of the USSR in Moscow

The other new Foreign Associate of the Academy is a leading English mathematician, Dr. Sidney Chapman of the Imperial College of Sciences and Technology in London. Besides working in pure mathematics, Dr. Chapman has carried on researches in meteorology and terrestrial magnetism. During the war he was a scientific adviser to the British army

Among the 29 American scientists who were elected to membership in the Academy are two directors of important industrial research laboratories They are Dr. Elmer K Bolton of the chemical department of E I duPont de Nemours and Company, and Dr Chauncey Guy Suits of the General Electric research laboratory

Two department heads in the Carnegie Institution of Washington were elected to Academy membership They are Dr Millislav Demerec, director of the Department of Genetics, and Dr Merle Antony Tuve, director of the Department of Terrestrial Magnetism

Chemists carried off the honors in number of new memberships. Among those elected are Prof Rudolph J Anderson of Yale University, Prof Morris S Karasch of the University of Chicago, Prof Karl Paul Link of the University of Wisconsin, Prof Joseph E Mayer of Columbia University, Dr Charles S Piggot of the Carnegie Institution of Washington, Prof George Scatchard of the Massachusetts Institute of Technology, Dr. Roger J Williams of the University of Texas and Dean Frank C Whitmore of Pennsylvania State College

Physics is represented by Dr Samuel K Allison, director of the Institute for Nuclear Studies of the University of Chicago, and Prof Kenneth T Bainbridge of Harvard University.

Two geologists were made Academy members Dr Wilmot Hyde Bradley and Dr Wendell Phillips Woodring, both of the U S Geological Survey A professor of a related science, seismology, Dr Perry Byerly of the University of California, was also chosen

New Academicians whose work is in the life sciences include Prof Ernest B Babcock, University of California, Prof Marcus M Rhoades, Columbia University, Prof Tracy M Sonneborn, Indiana University, and Prof Chester H. Werkman of Iowa State College There are two psychologists, Prof Clarence H Graham of Columbia University and Prof Stanley S Stevens of Harvard University.

Three research fields are represented by one new member each Prof Jesse Douglas of Brooklyn College, mathematician, Prof Leslie Spier of the University of New Mexico, anthropologist, and Prof. Frederick E Terman of Stanford University, engineer.

The medical sciences claim three of the newly elected members Prof Paul R Cannon of the University of Chicago, Prof Robert F Loeb of Columbia University's College of Physicians and Surgeons, and Prof Esmond Ray Long of the Henry Phipps Institute, University of Pennsylvania

The Academy elected two new officers Prof D W Bronk of the University of Pennsylvania, who replaces the late Prof W B Cannon as Foreign Secretary, and Prof I I Rabi of Columbia University, Nobel Prizeman in Physics, who joins Prof Bronk on the Council of the Academy

Science News Letter, May 4, 1946

GENERAL SCIENCE

Newspaperman Awarded Medal by National Academy

➤ A SMALLTOWN newspaperman received one of the major prizes in the gift of American science, when Stuart H Perry, editor and publisher of the *Adrian Telegram,* of Adrian, Mich., was handed the J Lawrence Smith medal at the meeting of the National Academy of Sciences The award was made in recognition of Mr. Perry's original researches on meteorites This recognition of a non-professional's scientific work by the body that has sometimes been called the Senate of American science emphasizes anew the solid values that are often found in the scientific work of serious amateurs It is an American tradition that dates back as far as Benjamin Franklin

In all, five medals were presented at the meeting

The Mary Clark Thompson medal was given to Dr T. Wayland Vaughan of Washington, D C., former director of the Scripps Institution of Oceanography, "in recognition of his outstanding achievement in such purposeful and ingenious coordination of observations and generalizations made in and bearing on the fields of stratigraphic geology and paleontology"

The Henry Draper medal, awarded for investigations in astronomical physics, was presented to Dr. Paul Willard Merrill, of the staff of the Mt. Wilson Observatory, for numerous important contributions, in particular those on stellar spectroscopy.

Two of the medals were in recognition of important published works These were awards of the Daniel Giraud Elliot medal One went to Sir D'Arcy Wentworth Thompson, of St. Andrews University in Scotland, for his book, "On Growth and Form." The other was presented to Prof. Karl Spencer Lashley of the Yerkes Laboratories of Primate Biology at Orange Park, Fla., in recognition of the merits of a paper entitled "Studies of Cerebral Function in Learning," published in the *Journal of Comparative Neurology*

Science News Letter, May 4, 1946

PHYSICS

Passageway Opened For Bikini Atom Test

See Front Cover

➤ THE ATOMIC BOMB will not be dropped at Bikini until July, but the tropical quiet of that Marshall Islands atoll has already been rocked by lesser blasts

The explosion, shown in the Joint-Army-Navy Task Force photograph on the front cover of this SCIENCE NEWS LETTER, knocked out a coral head just off shore to open a passageway into the beach for a boat landing

Techniques used by the Seabees assigned to Joint-Army-Navy Task Force One were developed by them during the Pacific war

Science News Letter, May 4, 1946

PHYSICS

Atomic Powered Navy

Program for developing propulsion of ships, submarines and aircraft by nuclear energy, with civilian commission, is planned by Navy.

➤ A NAVY powered by atomic energy as well as fighting with atomic weapons is visualized by Rear Admr Harold G Bowen, chief of the Navy's Office of Research and Inventions

A vigorous research program for developing the propulsion of ships, submarines and aircraft by nuclear energy is planned by the Navy under the general guidance of a civilian atomic energy commission

Admiral Bowen, speaking before the Engineers' Club of Philadelphia, declared

"The prospects of harnessing atomic energy for the purpose of driving ships in the near future is an amazing possibility"

"If we start with a large vessel," Admi Bowen said, "we will find that the elimination of the boilers and associated auxiliaries, as well as thousands of tons of fuel oil, offers the possibility of more advantageously disposing of weight The application of this principle to commercial carriers is obvious The bottoms of ships can be materially strengthened by using thicker plate, the whole hull structure can be materially strengthened, and armor can be more generally used, all with the idea of making ships less vulnerable to attack by atomic or other forms of bombing

"Since economy of fuel will no longer be essential, turbines will be completely redesigned, with the whole idea of increasing the amount of horsepower per pound of turbine as much as possible With resulting greatly increased speeds, there will follow a complete redesign of the underwater body Marked increases in speed will be conducive to reducing the possibility of effective bombings, etc

"We will be searching for an ideal coolant for the atomic pile which will be, we hope, fluid from room teperature to 1500 or 2000 degrees Fahrenheit, and not capable of becoming radioactive The design of the necessary heat exchangers will furnish a fascinating problem to those who are versed in the art of heat exchange"

Admi Bowen also listed five other problems in atomic energy that are Navy responsibilities·

"The development of nuclear munitions, and the vehicles to launch and carry them,

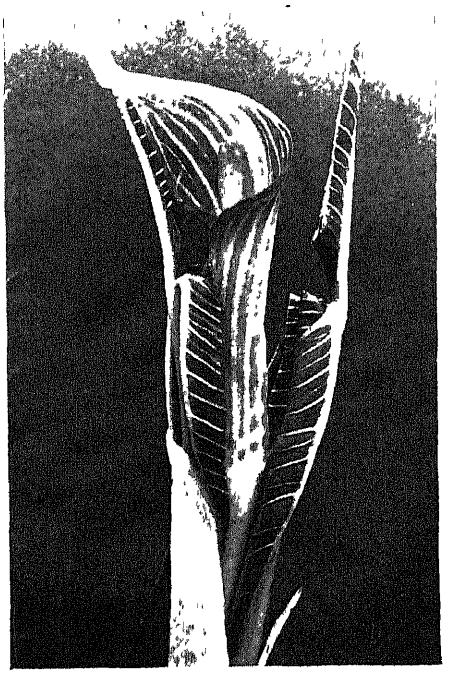
"The utilization of nuclear studies for the medical sciences,

"The exhaustive exploration of all possible countermeasures to nuclear munitions and their carriers,

"The maintenance of a broad program of research in nuclear physics and the allied fields of science, and

"The education and training of naval personnel in nuclear energy and its applications"

Science News Letter, May 4, 1946



***SPRING BANNERS**—New leaves are sometimes called by poets "the banners of spring." Here we see the banners unfurling. When Jack-in-the-pulpit prepares to bloom, a tall spike pushes its way up. Within, tightly rolled, are the curious floral structure of this plant and a pair of leaves. Nature photographer Lynwood M. Chase, New Bedford, Mass., has here caught the moment when the flower has partly opened, but the leaves are still close-rolled.*

CHEMISTRY

DDT's Future Questioned

War-born "Ersatz", it proved better than insecticides it replaced but may in turn be replaced by other chemically related compounds now made in small quantities.

➤ DDT, now hailed as man's best weapon in the never-ending war against insect pests, isn't here because it was wanted in the first place It was developed as a wartime "Ersatz" insecticide, to pinch-hit for old favorites like pyrethrum and rotenone when supplies of these were cut off or made inadequate by the war—and it surprised even the scientists who worked with it by being a more effective insect-killer than the ones it replaced.

At the meeting of the National Academy of Sciences, Dr H. L Haller of the U S Department of Agriculture told the story of DDT up to now, and gave glimpses into its possible future One quite possible future for DDT may be that it may not have any. That is, Dr Haller explained, it may be replaced by other chemically related compounds now being made in small quantities and tested, some of which may well prove to be even deadlier to insects than the parent compound, and at the same time less poisonous to larger and more desirable animals that swallow it incidentally or accidentally

Discovery of DDT's value made life easier for chemical searchers for synthetic insecticides by demonstrating conclusively that to be an effective insecticide a compound does not need to be complex, with big, hard-to-synthesize molecules, like rotenone, pyrethrum and nicotine Nicotine has been made synthetically, though it still remains cheaper and more practical to extract it from tobacco. Rotenone and pyrethrum have not been synthesized at all, and now it appears unnecessary to attempt the task DDT has a small, relatively simple molecule, and the new British insect-killer, benzene hexachloride or 666, has a mole-

cule even smaller and simpler in structure.

With successes like these to start on, chemists are making modified molecules of the same general pattern—for example, substituting fluorine for some of the chlorine atoms in DDT, with interesting-looking results in the tests. It may be that we shall have an analogue for the history of the sulfa drugs, at first there was only sulfanilamide, but after a while the sulfa compounds could be counted by the dozens, and from being expected to lick all the bacteria in sight, sulfanilamide presently became assigned to a narrower sector where its work was really effective Some years hence, the now almost-universal insecticide, DDT, may be only one weapon in the entomologist's armory, with many more of the same general class ready for special missions on the hexapod front.

Science News Letter, May 4, 1946

ELECTRONICS

Fog Turned to Rain

Siren blasts clear landing fields. Inaudible, high-frequency sound waves, without unpleasant effect of sirens, to be tested.

➤ SOUND WAVES that convert fog into rain may be used instead of wartime flame vaporizing systems to keep future landing fields clear for aircraft, according to officials at the Navy's Landing Aids Experiment Station at Arcata, Calif

Successfully tested against fog, the first sound system used a battery of sirens whose blasts not only bombarded particles of fog into rain but also nauseated personnel on the airfield

For the future, a new system to be tested this summer will send out ultrasonic waves that are inaudible to human ears Transmitting vibrations at 20,000 to 40,000 cycles per second, the equipment is expected to operate as effectively against fog as the sirens but without the unpleasant effects of the latter.

During the war, the British pioneered in FIDO, fog investigation and dispersal operations, and they developed the important Haigill system, that permitted Allied aircraft to land at bases in Britain in severe fogs The principle used is that of vaporizing the fog by intense heat from controlled fires lining landing strip runways

Disadvantages of Haigill include the high cost, as much as $4,000 or $5,000 to land one plane with high-octane gas as the fuel for flames. Although this cost was small compared with the lives and equipment saved during the war, intensive research has gone into modifications of the system.

Probably the best thermal installation for clearing fog from airports is the one scheduled for the test at Arcata during the next two months Known by the code name ELMER, this vaporizer can reduce fuel costs for a landing to as little as $150 ELMER can burn gasoline, kerosene or diesel oil and has an atomizing nozzle with electrical heating elements for igniting it instantly Haigill systems burned more expensive fuel and required 10 minutes of "warm-up" for effective operation

While the Navy experimented with ELMER, it also started an investigation of sonic fog clearing The first tests worked well against the fog but created new problems.

A battery of 12 powerful air raid-type sirens with 24-foot wooden amplifying horns blasted a heavy fog over the experiment station with enough force to merge the fog particles into raindrops that fell to earth, clearing the overcast above the landing field Personnel on the field had cotton in their ears, with a sponge rubber covering over the outside. They reported no ear trouble, but most of them became nauseated from the intense sound

The powerful sirens also proved to be more effective than a hunter's horn, as several birds were blasted out of the sky by the noise

Now, experts at the Navy's Landing Aids Experiment Station believe that the answer is in the use of ultra-sonic transmitters sending out waves at such high frequencies that men and animals won't be able to hear them.

Two problems that sonic engineers hope to answer with full-scale experiments this summer are the possible effects of the sound blasts on personnel in planes and the danger of damaging aircraft by the powerful waves

If the tests are successful, Navy officers believe that high-frequency sound systems will be more practical than thermal fog dispersal A sonic system would have approximately the same initial cost as flame installations and could be operated more economically. For Naval use, the sound system may be developed for aircraft carriers. Now being investigated, sonic installations on carriers would enable the big ships to improve their own weather under adverse flying conditions

A third fog-clearing system tested here used a huge blower to throw curtains of hot air at right angles to the wind Causing the wind to move in a vertical circle, this wave of hot air consequently dispersed the fog

Science News Letter, May 4, 1946

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MEDICINE

Penicillin and Syphilis

It is the best and safest treatment for the disease. There is no need for alarm over relative inefficiency of one kind of the drug.

➤ PENICILLIN is the best and safest treatment for syphilis yet devised Patients who have been treated with it during the past several years and their doctors need not be alarmed by reports of its being ineffective, the syphilis study section of the U S Public Health Service declared in a statement.

Military secrecy necessary during the war was responsible for some of the confusion over penicillin and its effectiveness in treating syphilis During the war only a very few persons were allowed to know anything about the chemical studies of penicillin Those studies revealed the fact that there are at least four kinds of penicillin, called G, X, K and F in this country.

Manufacturers, meanwhile, were producing penicillin as fast as they could and were trying, quite laudably, to make their product as pure as possible. In the course of these efforts to get more and purer penicillin, they began getting and marketing penicillin containing substantial amounts of penicillin K

Penicillin K, Dr. Alan Chesney of Johns Hopkins Medical School announced in mid-February of this year, is completely ineffective in treatment of syphilis in rabbits

That bombshell startled scientists and manufacturers A meeting was called Immediately after, manufacturers began taking steps to decrease the amount of penicillin K in their products

Dr Chesney's studies were made with pure penicillin K Commercial penicillin, however, has not consisted of pure K So patients treated with the commercial product, even since 1944 when K was predominant in some of the penicillins marketed, probably got some of the other kinds as well as K They may relapse or they may not. If they relapse, they can be treated again.

They are in no more danger of getting paresis, or syphilis of the brain, than if they had been treated by any other method, Dr Joseph Earle Moore, of Johns Hopkins Medical School and chairman of the syphilis study section of the U S Public Health Service, declared in discussing the situation at the National Academy of Sciences meeting.

Less than one in a hundred are in danger of getting paresis, he said

Every patient with syphilis should return for retesting at regular intervals throughout his life, no matter what treatment he has had, Dr Moore continued.

Patients treated at the U S. Public Health Service rapid treatment centers are routinely asked to return for retesting. This has nothing to do with whether or not they were treated with penicillin If on retesting it is found that any have relapsed, they will be retreated

Larger doses of penicillin given at more frequent intervals are suggested by Dr Moore as one way doctors can be sure they are getting enough of the drug at present while there is any question of its containing much of the relatively ineffective penicillin K

Penicillin K, he said, is one-tenth as effective as penicillin G in syphilis It is one-sixth as effective as G in treating pneumonia in mice and one-fourth as active as G in treating streptococcus infection in mice Patients with these acute infections, however, are not in any danger of not getting enough penicillin to get them well.

The reason penicillin K is less effective than the other varieties is that it is more rapidly destroyed in the body.

Resistance to penicillin which some disease germs have developed and the difficulty in curing subacute bacterial endocarditis, a chronic heart ailment, with penicillin may both be due to the increased amounts of K in penicillin since 1944, Dr. Moore said.

Science News Letter, May 4, 1946

SOCIOLOGY

Atoms May Revolutionize World Social Order

➤ LIVING with atomic energy in peacetime may be as revolutionary to world society as the first nuclear fission bomb explosion was to warfare, a University of Chicago sociologist declared

If we do succeed in outlawing war, Dr Louis Wirth told the Illinois Association for Applied Psychology that social implications of peaceful atomic energy may be just as powerful, if not so destructive, as the new bombs were.

He said that atomic energy used as power could change the pattern of agriculture and industry in the world by making possible the development of outlying virgin areas of the earth This could either raise the world's standard of living or at least more nearly equalize it, the sociologist asserted

With atomic energy to serve them, men would have much shorter working hours, he predicted

"We can only contemplate vaguely," Dr Wirth warned, "what problems will be created when the masses of men will be emancipated from drudgery and will have at their disposal the leisure of which the Utopians have dreamed."

Social benefits from the peaceful atomic age forecast by the sociologist include a closer world with new institutions of human collaboration and the end of insecurity, prejudice and bigotry.

He warned against defensive measures in the future, asserting that efforts to disperse cities or build industry underground are "measures of short-sighted desperation."

"Most important of all in our neglect of the social implications of atomic energy development," he charged, "is the fact that unless the military use of it is controlled there may not be a civilization with problems of adjustment."

Science News Letter, May 4, 1946

AERONAUTICS

Carrier-Based Planes Helped To Steer Vessels

➤ WHEN COMBAT planes do ordinary stunts in the air, it is not news But when Navy carrier-based planes helped to steer their mother-ship, it is something different. It works when the vessel is traveling at low speeds in narrow waters.

Two rows of planes were lined up facing each other along the forward part of the flight deck, and firmly anchored in position By turning up to full speed propellers of the airplanes in the left row at the same time, the bow of the vessel was swung to the right. The other row swings it to the left The tugboat has a rival.

Science News Letter, May 4, 1946

Calcium is the mineral element most likely to be lacking in the American diet.

Clothes in a storage closet can be freshened up by using an electric fan for an hour a week to change the air; in summer the process discourages moths.

TECHNOLOGY

Cheaper Active Carbon

A simple process by which active carbon may be manufactured from anthracite may now be achieved, recent investigations indicate.

➤ ACTIVE CARBON, widely used as an adsorber of gas impurities in air and of color and odor in water, may some day be obtained cheaply from anthracite coal, recent investigations at State College, Pa., indicate. Obtaining active carbon from anthracite is not new, but a simple process by which it can be manufactured cheaply, one object of the investigation, may now be achieved. The raw material is plentiful, the process not costly. It is a direct activation by selective oxidation with steam.

During World War I, anthracite was steam-activated on a commercial basis to yield the coal carbon, a moderately good gasmask carbon when compared with good carbons made from coconut shells. Later, steam-activated unbriquetted anthracites were prepared that were equal or superior to the coal carbon in activity, yet, it appeared that anthracite, generally, had never been raised to the highest activity possible commensurate with the weight loss during activation and the ash content of the activated material.

In the present work, carried out at the Pennsylvania State College by three members of the staff, J. D. Clendenin, W. T. Griffiths and C. C. Wright, the activation characteristics of several different anthracites, and of three specific gravity fractions of one anthracite, were examined by subjecting the coals to steam activation in a stainless steel retort. The different anthracites were high, medium and low-volatile types.

In general, the approximate yield of active carbon from the three coals was about triple the yield from commercial coconut shell, but the adsorption power was less. A hundred pounds of the active carbon from the medium volatile coal adsorbed 50 pounds of carbon tetrachloride, the high-volatile product slightly less and the low-volatile coal carbon 38 pounds of the compound. Commercial coconut shell active carbon adsorbed 68% of its own weight in carbon tetrachloride.

Science News Letter, May 4, 1946

CHEMISTRY

Synthetic Rubber Theory

Secret war process that shows how it is formed from oils agitated in soapy water described to National Academy by Dr. Harkins.

➤ A WAR SECRET theory that explains how synthetic rubber is formed from chemicals agitated in a soap solution similar to that on soapy hands was revealed to the National Academy of Sciences by Prof. William D. Harkins, University of Chicago chemist.

Differing from German theories which Prof. Harkins terms "naive", the theory developed in 1942-3 has molecules of the butadiene-styrene oil mixture standing upright like soldiers on parade upon the water surface between layers of soap molecules. In these oil layers very short single "monomer" molecules grow into much longer molecules, sometimes 1,000 to 15,000 joining to make one single long chain polymer molecule. When the long molecules coil up and become too thick to be held between the soap molecules they are ejected as rubber particles, many of them as small as a third of a millionth of an inch in diameter. Almost all the rubber produced in the United States grows in these minute spheres.

Since the manufacture of synthetic rubber was one of the major industrial tasks of the war, Prof. Harkins spent three years under the auspices of the Office of Rubber Reserve in a thorough test of this fundamental theory.

The rubber growth theory applies equally well to the manufacture of many other plastics.

Prof. Harkins presented startling facts about what happens in the submicroscopic chemical world.

Soap solutions dissolve oils in extremely thin layers and this gives the oil an extremely large area, ten acres per cubic inch of oil.

The thinness and large area cause the rubber particles formed to be so small that a cubic inch of oil forms 200 billion of these small spheres.

Each of us produces these oil layers whenever we wash our hands with soap.

The theory of orientation of molecules upon surfaces, developed about 30 years ago by Dr. Harkins, Dr. A. C. Langmuir of the General Electric Company and the British scientist, Hardy, has "revolutionized not only one of the branches of chemistry, but is also having a profound influence in biology."

Science News Letter, May 4, 1946

CHEMISTRY

Latest Antibiotic Comes From Wild Ginger

➤ GRANDMOTHERS and great-grandmothers who dosed the family with wild ginger tea had something, it now appears.

The latest antibiotic, or penicillin type of anti-germ disease remedy, to be announced comes from wild ginger, technically known as *Asarum canadense*.

The discovery of two antibiotics produced by this plant was made by Dr. C. J. Cavallito and Dr. John Hays Bailey of the Winthrop Chemical Company research laboratories at Rensselaer, N. Y.

One of the wild ginger antibiotics, labelled A, is a colorless compound active against pus-forming germs. Staphylococci, streptococci and pneumonia germs are affected by it. The other antibiotic, called B, is a lemon-yellow acid with less anti-germ activity.

The anti-biotics in wild ginger were discovered in the course of a search for such agents in higher plants. So far about 200 local New York State plants have been screened. Of these, garlic and burdock have also been found to produce antibiotics.

Wild ginger is abundant in woods from New Brunswick to Manitoba in Canada and as far south as North Carolina, Missouri and Kansas. Other popular names for it are false coltsfoot, asarabaca, Canadian snakeroot and colic root.

Although 98% of the old-fashioned home remedies that made use of plants and herbs may have been merely harmless, Dr. Cavallito is quoted as now viewing the home remedies with "a less sneering attitude than formerly."

Science News Letter, May 4, 1946

CHEMISTRY

New Dehydrating Process

Retains qualities of fresh food. Quick-drying "anhydrated" food will be put on the market next fall, Clarence Birdseye says.

➤ ANHYDRATED foods, produced by a new quick-drying method, will be tested on the market this fall, according to the inventor of the process, Clarence Birdseye, Gloucester, Mass, who revealed details of the new system of dehydrating foods to the spring meeting of the American Society of Mechanical Engineers in Chattanooga, Tenn

Declaring that fruits and vegetables treated by anhydration are "in every way as acceptable as if quick-frozen or freshly harvested," Mr Birdseye said that preliminary experiments have shown that the process may be used for a wide variety of products such as grains, synthetic rubber and resins, soap flakes and certain wood products, in addition to fruits and vegetables

He reported that the damage done to food in present tunnel dehydration is caused by the relatively long periods of heating While the final drying process in the present method may require as much as 18 hours, Mr Birdseye said that his new apparatus will reduce the moisture content of shredded cabbage from 94% to 3% in one hour and 25 minutes

Anhydrated foods may be rehydrated and cooked in from 7 to 20 minutes, he reported

During the war, Mr Birdseye, a pioneer in the development of concentrated foods, said that U S. production of dehydrated food increased from 20,000,000 pounds annually to 200,000,000 pounds in 1944, most of the latter going to the Armed Forces

The processed food for the services was produced by tunnel drying using hot air currents as the sole method of dehydration In anhydrating, radiators serve to both shed infra-red energy on the product and transmit heat to the current of dehydrating gas passing through the new tunnel in which the food is treated

Carried through the tunnel on a belt, the food is also dried by heat from radiators on the floor, while the belt itself is made of a heat-conductive material

Food in the anhydrating tunnel is stirred by tedders over the belt, and hot air currents are played on the food at a high enough velocity to help stir the food being dried.

Anhydrators now under construction will have a capacity from 2,000 to 3,000 pounds of water evaporation per hour, Mr Birdseye said, while simple changes will permit use of direct combustion gases instead of steam for heating

Science News Letter, May 4, 1946

TECHNOLOGY

Industries Asked to Probe German Technology

➤ IF ANY INDUSTRY or scientific group wishes to investigate German industrial methods, Uncle Sam will make the necessary arrangements for a mission to go to Germany

There is one proviso The investigation must promise to be of value to U S industry as a whole, in the opinion of the Department of Commerce's Office of the Publication Board

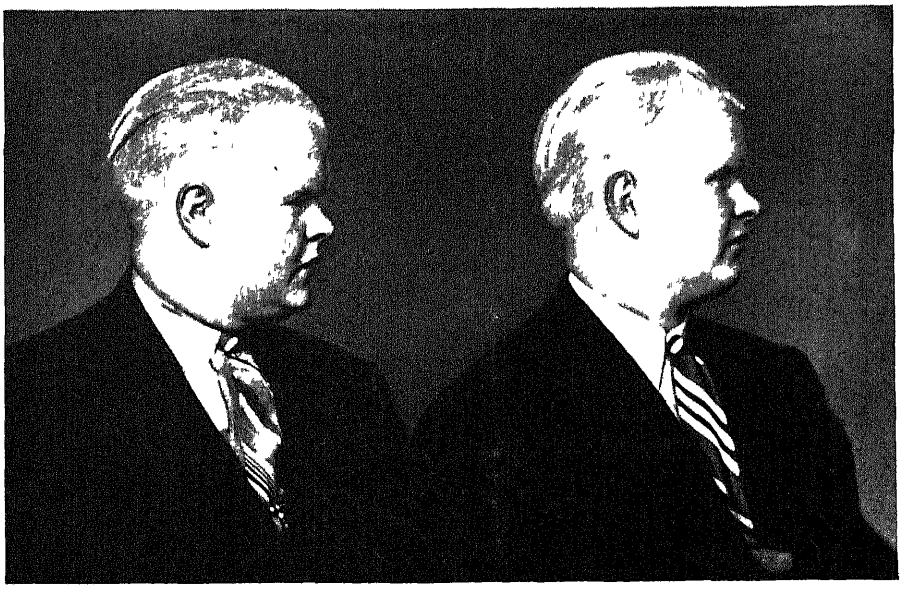
Teams of experts drawn from industry went into Germany not far behind the troops, and as a result tons of technical documents were amassed Many of the reports of these numerous expert teams are now being issued by the Department of Commerce in both full-size and microfilm forms

The Commerce and War Departments are now about to begin selecting from this accumulation what more is worth making available to American industry

The Department of Commerce statement declares that these documents contain "priceless information " Investigators have already found many new formulas, products and processes which, it is declared, American industry is already beginning to use

Industry's help in recruiting qualified technicians to search the captured German files is being requested Technical men with a knowledge of technical German are needed who are familiar with chemicals, aeronautics, automotive industry, machine tools, industrial equipment, fuels and lubricants, metals and minerals, communications equipment, scientific instruments, shipbuilding and textiles

Science News Letter, May 4, 1946



RARE COMBINATION—Only one birth in three million in the United States is of albino identical twins, state Dr. David C. Rife, M.D., Schonfeld and Marilyn Hunstead of Ohio State University. They base this estimate on the fact that only one person in ten thousand is an albino, and about one birth in three hundred is of identical twins. These two men are strikingly similar in voice, mannerisms and observed personality traits. Like other albinos their vision is poor. They have three brothers and three sisters. Two of the brothers are also albinos, but the other brother and all of the sisters have normal coloring. The parents also have normal pigmentation, the geneticists state in the Journal of Heredity.

VETERINARY MEDICINE

Penicillin Cures Dairy Cattle Disease

➤ PENICILLIN has more curative power than any other tested drug for common mastitis, the most prevalent disease among dairy cattle

Used in three large doses of 50,000 units each, at 24-hour intervals, penicillin cured 92%, in University of Wisconsin tests Single large doses cured about half the cases, and more where the infection was not serious or of long standing

The drug proved generally helpful for dry and milking cows, causing little irritation, and had no apparent effect on milk production. It was more valuable in chronic cases than in acute flareups

The tests were conducted upon mastitis caused by a streptococcus, which is the most common form The veterinary scientists at the University of Wisconsin stated that other forms of the disease may respond better to sulfa drugs than to penicillin Dairymen were advised to rely on a veterinarian's diagnosis.

With cows of average value it will often be practical to try first a single treatment with 50,000 units If that fails, and the animal is valuable enough, a series of treatments can be used, administering three treatments of 50,000 units each at 24-hour intervals

The University scientists emphasized, however, that drugs can only cure, and will not prevent the disease or reinfection with it, thereby making it as important as ever to hold mastitis to a minimum by practicing strict sanitation

Science News Letter, May 4, 1946

GEOPHYSICS

Oil Search in New Deep Sea Diving Bell

➤ A NEW diving bell will permit scientists to descend 250 feet into coastal waters carrying gravity meters to search for new off-shore oil deposits Eugene Frowe, of the Robert H Ray Co, Houston, Tex, has reported this to the Society of Exploration Geophysicists.

Gravity meters are used extensively for land prospecting to detect sub-surface structural changes that tell where oil is likely to be found They have not been successful under water because of boat motions and ocean currents. The new diving bell will give the instrument the same stability under the sea surface down to 250 feet as it would have on land

Fifty inches high and 60 inches in diameter, the bell has two concentric cylinders with water ballast separating them It uses two air lines, one for breathing and one for regulating the ballast, and is designed to be lowered and raised from a crane mounted on a barge.

Both air lines can be used for ventilation as a safety measure, while a device is provided for automatically blowing the water out from between the cylinders in event of a power failure An additional safety feature is an escape lung similar to those used on submarines

Science News Letter, May 4, 1946

PUBLIC HEALTH

Better Protection of Workers Against Silicosis

➤ BETTER PROTECTION of workers in certain industries from the hazard of silicosis appears likely as a result of a new method of sorting the dust in air developed by the Industrial Hygiene Foundation at Mellon Institute, Pittsburgh.

Silica particles so fine that more than 100 million can be piled on the head of a pin can now with the new method be sorted out of larger dust in factory air, Dr Francis R. Holden, of the Foundation, said in reporting the new development at the meeting of the American Industrial Hygiene Association in Chicago

The finer the silica dust, Dr. Holden continued, the greater the danger, because only microscopic particles smaller than five microns are likely to damage the deep lungs Particles larger than five microns, which is about the size of a red blood cell, are more readily trapped in the filter mechanism of the nose and throat.

Dr Holden described the collecting, counting and analysis of dust in the dangerous size ranges as follows.

"Visible and invisible dust in the workplace is determined by condensing dust floating in atmosphere equivalent in size to a small room, into a capsule-sized sample This is done by drawing a measured volume of air through a powdery substance (salicylic acid) The substance is then dissolved in alcohol and the dust sample remains"

Through a process of sedimentation the total dust sample is divided into particle sizes above and below five microns After the smaller particles have been counted and analyzed by X-ray, the chemist can now determine the degree of a silica hazard with greater accuracy than formerly.

Science News Letter, May 4, 1946



ENGINEERING

Dwelling Houses Quickly Built of Vacuum Concrete

➤ BY SUCKING water and air out of concrete, dwelling houses of this noncritical material may be more quickly constructed The process involves the use of a vacuum to cause concrete to harden rapidly, and a mechanical lifter which raises precast sidewalls into position without danger of damage.

The vacuum concrete process is not new; it has been in use for about eight years. The details of the process, however, have been pretty well confined within the trade. The mechanical lifter is new; with it, entire sidewalls, precast in horizontal forms lying on the earth, can be handled quickly and easily

The vacuum process, by means of plywood mats under which a vacuum is created by a vacuum pump, removes the water in the plastic mixture that is not needed to hydrate the cement It removes entrapped air also. This permits the concrete to shrink as it hardens. In the process, suction alone is not used. With it is combined pressure to compact the material. This pressure is an integral part of the process, and it approximates 1,500 pounds per square foot

Science News Letter, May 4, 1946

ELECTRONICS

Radar Used Successfully Against Ground Targets

➤ RADAR EQUIPMENT intended primarily for use against enemy aircraft proved highly useful in fighting on the ground, it is revealed in the *Coast Artillery Journal* (March-April)

Early in the development of radar, it was discovered that it could detect and track shells fired from mortars and field artillery pieces This knowledge was put to good use in finding well-concealed enemy batteries. American shells sent back along the same courses silenced the batteries.

It was also found possible to detect and track enemy tanks, mobile guns and even moving bodies of troops. To do this, it was necessary to modify the radar so that it would filter out echoes from stationary objects and register only the echoes from things that moved

Science News Letter, May 4, 1946

PHYSICS

Additional Weather Data From New Sound "Radar"

➤ A NEW WAY of probing the atmosphere immediately above our heads for weather predicting data by bouncing sound echoes was announced to the American Physical Society by two Bell Telephone Laboratories physicists, G W Gilman and F H Willis

This acoustic "radar" detects large changes in temperature overhead by the fact that the amount of sound returned is increased several times in volume when hot and cold air are intermingling violently. Such an atmospheric condition occurs when there is what is called a cold or warm front, likely to be accompanied by storm.

The new device, christened "sodar", launches vertically upward from the ground a sound of low-power that is in range of human hearing The echoes are received and changed into oscilloscope patterns that can be viewed visually

Since the behavior of microwave radio signals as well as many weather phenomena depend upon the distribution of temperature, humidity and air movement in the atmosphere, sodar promises to be important in forecasting radio conditions in the future

Science News Letter, May 4, 1946

GEOLOGY

Mississippi River's "Grand Canyon" Discovered

➤ A CANYON five miles wide with walls more than 600 feet high has been discovered along the lower Mississippi river by oil prospectors You can not "see" it without a seismograph for studying the geological structure of the area

The Mississippi's "Grand Canyon" was described by Walter J Osterhoudt of the Gulf Research and Development Co.

Geologists have known for some time that there should be a canyon on the lower part of the "Father of Waters," but where it was or what had happened to it was one of the principal unsolved problems of submarine geology

The answer, discovered by oil prospecting parties in the Mississippi delta region, is that the canyon is still there, but it has been filled in with sand and mud

The huge canyon, cut by the river within recent geological history, was first spotted by seismograph readings in the region south of Timbalier Bay in Louisiana that revealed a sharp deepening beneath the surface of the delta This underground structure proved to be the east bank of the missing canyon

Further tests revealed evidence of the canyon at three other points near the present river channel from Houma, La, to the Gulf of Mexico

The Mississippi was once so much more powerful than it is today that it could scour the deep channel far below sea level

Science News Letter, May 4, 1946

NUTRITION

Yeast Eaters Missed Out On Vitamins, Study Shows

➤ THOSE PERSONS who regularly ate one or more squares of fresh baker's yeast daily with the idea of supplying themselves with extra amounts of B vitamins missed out, University of Wisconsin scientists report

The yeast eaters not only failed to get extra amounts of B vitamins but may even have lost some of the vitamins they had gotten from other foods

Yeast was promoted as a good source of vitamins because of its high content of them The living cells of fresh baker's yeast, however, hang on to their thiamin and riboflavin so the yeast eater does not get any of these vitamins, Drs. Helen T Noss, Echo L. Price and Helen T Parsons have found The living yeast cells, moreover, probably take some of the thiamin released from other food.

These new findings will be reflected in changes in the labels of compressed yeast, or fresh baker's yeast, if the labels have not already been changed

If the yeast is killed by boiling or by a commercial process in preparing dried yeast, it becomes a good source of thiamin and riboflavin for human nutrition

Carp and some seafoods, if eaten raw, the scientists reported, also may interfere with utilization of thiamin. This is because an enzyme in the fish and seafood destroys the vitamin Cooking, in turn, destroys the enzyme. So eating raw clams may rob you of all the vitamin B_1, or thiamin, you would get from the rest of your meal, while clams cooked, as in chowder, would not

The vitamin studies were reported at a joint meeting of the Wisconsin Academy of Sciences, Arts and Letters with four other Wisconsin organizations.

Science News Letter, May 4, 1946

ASTRONOMY

First-Hand Account of Fall of Meteorites

➤ IF IT HAPPENED now, the cry would be. "Atomic bomb!" When a shower of meteorites was actually witnessed in broad daylight by a large number of Moros in the Philippines in 1938 many believed the end of the world had come

Just reported scientifically after this lapse of eight years, astronomers are analyzing the unusual story

Few men have ever had the opportunity of watching "shooting stars" actually fall to earth, and of recovering bits of these visitors from space while still hot from their flight.

But a college-trained man, H J Detrick, witnessed the fall of the Pantar, Lanao, Philippine Islands meteorites and talked with natives who were only a few feet from where the aerolites fell.

Sounding like explosions from the exhaust of an airplane, and continuously emitting ringlets of smoke, the fireball sped on its course across the sky, on June 16, 1938, at 8·45 a m, Mr Detrick states in his report. Its career ended with terrific explosions and thunderous vibrations that caused doors and windows throughout the town and countryside to rattle. These mighty explosions created a huge gray-and-black cloud, filled with bursts of flame, that spread out in the heavens. The cloud persisted for more than 30 minutes

At Panta, immediately beneath these mighty blasts, a number of Moros saw fiery objects with tails of smoke shooting out from the cloud during the terrific blasts. The fiery dots disappeared a short distance from the cloud, but a few seconds later many small objects fell to earth

"Several galvanized-iron-roofed houses of these Moros were in the zone where small objects, 'as big as corn and rice grains,' fell by the thousands in a great shower—the pattering sounding like hail!" Mr Detrick reports Some of the meteorites, falling directly to the ground, sank a foot and a half into the ground The deepest one, found 20 inches below the surface and smelling like burned gunpowder, was recovered while still hot 10 steps from where the Moros stood

The detailed account of the phenomena recently reached Dr H. H. Nininger, director of the American Meteorite Laboratory in Denver, and was published scientifically in the journal, *Popular Astronomy* (April)

Science News Letter, May 4, 1946

PHYSICS

Exploding Atoms

May aid the study of cancer, explain how the green leaf synthesizes food and fuel, and explain just what happens in some of the major industrial processes.

By WATSON DAVIS

➤ EXPLODING atoms, by-products of the atomic bomb, promise to discover some of the world's major scientific secrets These include how the green leaf synthesizes food and fuel, what makes cancer cells run wild, how the minute cells at the very beginning of a human life know what to do, just what happens in some of the major industrial processes such as cracking oil to obtain gasoline

The atom bomb is revolutionary and world shaking The use of artificial radioactive isotopes for tracer and atom tagging experiments in chemistry, physics, biochemistry, and medicine, may be even more world shaking The new tools which are being used are varieties of chemical elements called isotopes Carbon 14, a radioactive isotope of the ordinary carbon which composes so much of the world we live in, is now to be had as a by-product of the atomic bomb research It is made by transmutation of nitrogen 14 bombarded by neutrons

"A whole vista of opportunity is opened up as the result of the availability of the C-14 isotope," according to Dr Glenn T Seaborg, co-discoverer of the bomb element, plutonium, and the newer elements known to chemists as numbers 95 and 96 Professor of chemistry at the University of California, Dr Seaborg is engaged in atomic research at the Metallurgical Laboratories at the University of Chicago

"Organic chemists, biochemists, physiologists and the men of medicine," Dr Seaborg reported to the American Chemical Society meeting at Pittsburgh, "have dreamed for years of the day when a radioactive isotope of carbon suitable for tracer investigation should become available"

The first and most obvious application in organic chemistry for C-14 would, in Dr Seaborg's opinion, be a study of the rearrangements that take place in organic molecules "There are a number of reactions," he says, "in which carbon atoms or groups of carbon atoms move from one part of a molecule to another The question of just how this migration is accomplished has been a subject for discussion among organic chemists for many years By labelling the migrating groups in certain positions," by introducing radioactive carbon atoms into the molecule, it should be possible to determine the precise sequence of events in such a reaction

Has Other Isotopes

Carbon, whose normal atomic weight is 12, has other isotopes as well There is a heavy, stable variety, C-13, which can be detected in compounds by its greater weight C-13 can also be used to replace C-12, and its ultimate place in the new compound determined

"Actually these isotopes complement each other," says Dr Seaborg, "and it is very fortunate that both are available There now exists the interesting possibility of tagging each of two different carbon atoms in a molecule or system, and then simultaneously observing the course of each"

Still a fourth variety of carbon is known, C-11, which is radioactive but has a very short period of activity, so that its travels cannot be followed over as long a period as can those of C-14. Nevertheless, Dr Martin D Kamen and the late Dr Samuel Ruben of the University of California, and Prof William Z Hassid, formerly of the University of California and now at Washington University, St Louis, were able to use radioactive C-11 in a study of photosynthesis in which considerable progress was made

"Radioactive carbon dioxide," states Dr Seaborg, "was fed to the unicellular green alga Chlorella and also to higher plants under various controlled conditions in the light as well as in the dark. The results obtained so far have been rather surprising The higher plants and the algae reduce carbon dioxide in the dark. This process takes place concurrently with the release of carbon dioxide by respiration, so that the net effect is an evolution of carbon dioxide"

The part of the plant to which the radioactive carbon atoms travelled was examined to try to find the chemical compound into which it had been built in the process of photosynthesis

"Attempts to identify the radioactive substances formed in the dark and in the light have been thus far unsuccessful. It is of considerable interest to note that formaldehyde, which has played a prominent role in many proposed mechanisms, was not identified from the radioactive carbon dioxide introduced. Experiments with the ultra-centrifuge and diffusion methods indicate the average molecular weight of the radioactive molecules to be about 1,000, which explains the failure to identify chemically these molecules with any small molecules"

Radioactive isotopes of all the chemical elements are now known, and those of several besides carbon are contributing to our newer knowledge of life processes Hydrogen 3, for example, may be introduced into many organic molecules, and followed through a series of shifts in much the same way as carbon 14, except that it is somewhat more difficult to detect

"Radiophosphorus has been the most widely used of all the artificially prepared radioelements as a tracer for metabolic studies in biological systems," says Dr Seaborg "The distribution of administered phosphorus in human and animal tissues has been extensively studied."



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A single dose of disodium phosphate tagged with radiophosphorus has been found to accumulate to the greatest extent in the bones, next in the muscle and so on in decreasing order in liver, stomach and small intestines, blood, kidneys heart and least of all in the brain However, other experiments showed that in cases of leukemia the abnormal tissues accumulated unusual amounts of radiophosphorus This opens the possibility that cancer may be treated by radioactive elements which concentrate and give out their beneficial rays in the very tissues which the rays are planned to treat

Concentration of a certain element in one part of the body is well known in the case of iodine, which is absorbed to a large extent by the thyroid gland, even though the absolute amounts of iodine used by the body are extremely minute Radioactive iodine in an appropriate combination may be swallowed by a patient who has placed a Geiger counter, which detects radioactive rays, near his throat

The arrival of the jagged atoms of iodine in his thyroid will promptly make itself known on the instrument The differences in metabolism rate for the various types of thyroid activity characteristic of patients with different thyroid activity are easy to determine by this simple and direct method of measurement

"An interesting piece of work to the comparative biologist," comments Dr Seaborg, "was done by Dr Aubrey Gorbman, of Wayne University, who found in certain invertebrates having no thyroid gland, that iodine is nevertheless concentrated in a marked fashion in a part of the organism whose function was not previously known It is, therefore, this primitive organ that is probably the predecessor of the thyroid gland in higher animals"

From the utilization of tagged atoms in every-day life processes, the next step is to the migrations of atoms in newly forming embryos "It is not difficult," says Dr Seaborg, "to imagine ways in which the use of radioactive tracers will contribute to the solution of fundamental problems in the field of genetics, although some of the concepts are vague at the present time as to the actual planning of the experiments

"It is evident, for example, that some causal relation must exist between the gene (or genes) for brown eyes, let us say, and the actual deposition of pigment in the cells of the iris This problem has already been attacked by Dr George W Beadle of Stanford University and his associates by classical methods, but the availability of radioactive isotopes should make the solution of the problem much easier

"Not unrelated to this problem, but in the field of embryology, is the problem of the 'organizer,' the substance or substances responsible for guiding the course of cellular differentiation in the developing embryo The nature of this substance or substances is only incompletely understood, and its detailed method of action unknown Here again radioactive tracers may be expected to facilitate the investigation of this problem

"Radioactive isotopes will also contribute to future advances in investigations dealing with such fundamental problems as the mechanism for the transformation of chemical energy to mechanical movement in living things Thus, today, no one knows quite what brings about a constriction of a muscle fiber, or even what mechanism is responsible for the movement of an amoeba

"A possibility, which may sound quite startling, is that of tagging bacteria with radioactive C-14 This does appear to be feasible and to open great possibilities in the study of disease In fact Prof Israel Chaikoff and Dr Alexander Kaplan of the University of California have made a beginning by tagging the tuberculosis bacillus with radioactive phosphorus in some experiments which have not yet been brought to completion

"Many more possibilities for the use of radioactive isotopes in bio-chemical and physiological work might be suggested, but those given above suggest typical possibilities Obviously, many of these problems are of profound significance in terms of human welfare"

But the biological field, full of possibilities as it is, is not the only one where the new techniques can bring valuable new information "With respect to chemical problems of direct interest to industries," says Dr Seaborg, "many examples could be cited Among these may be mentioned studies, with C-14, of the mechanism of catalytic cracking, isomerization and alkylation of hydrocarbons which are of profound interest to the oil industry

"The future," Dr. Seaborg concludes, "seems to hold unlimited possibilities for the application of radioactive tracers to scientific problems It is certain that the applications of radioactive tracers which have been made so far are just the beginning of what is going to become an extremely large and successful field of research"

Science News Letter, May 4, 1946

CHEMISTRY

Waterproof Felt Hats Retain Shape and Size

➤ NOW MEN can have waterproof felt hats that retain their shape and size permanently They look like ordinary felts, but the material is a combination of wool with a plastic fiber that keeps the hat in proper shape and makes it shed water

The plastic is a vinyon fiber, which is a polyvinyl chloride-acetate made from vinyl resin dissolved in acetone In the hat-making procedure, it is "set" by a special heat-treatment, and becomes fused with the wool fibers

While water-repellent under most circumstances, it can be wetted through by thorough soaking, but even then does not lose shape or shrink, it is claimed It is unaffected in dimensions by the ordinary commercial dry cleaning, steaming and pressing methods

Science News Letter, May 4, 1946

America has now at least 300 companies packing *frozen foods,* 40,000 stores selling them, and 2,000,000 families using these fresh fruits, vegetables and other articles of diet.

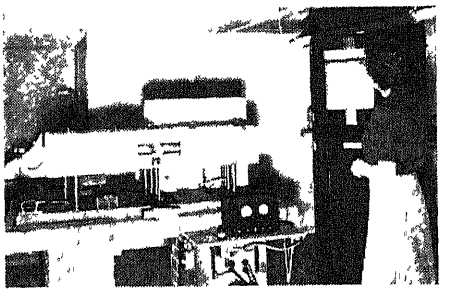


Photo courtesy Ohio State University

CHART INFRA-RED ABSORPTION with SPEEDOMAX

The Speedomax Recorder, L&N's high-speed potentiometer in which the balancing mechanism is electronically controlled, is being used by many labs today to check purity of chemical compounds by infra-red spectrum It is extremely rapid—pen moves across chart in 1-1/2 seconds You provide the amplifying link between the Recorder and the radiation receiver of your own spectrometer—thus converting the instrument from spectrometer into spectrograph

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Do You Know?

When *pruning* plants, it is better to prune too little than too much

The soft outer shell of unripe *walnuts* is rich in vitamin C.

Chinese soldiers are said to keep *quails* for quail-fighting as a sport.

At one time heat was thought to be a weightless fluid called *caloi*

The *century plant,* which has a flower stalk that may be 30 feet tall, belongs to the same order of plants as lilies

Pink *oysters* have been shown to be infected with a yeastlike fungus, which indicates that they are not strictly fresh although not necessarily injurious

The leaves of the *foxglove* are gathered for the making of the drug digitalis when the flowers are about two-thirds opened.

Helicopters seem to have secured a place for themselves in American flying, one company reports an initial order for 500 for its latest model that has been granted a federal commercial license.

Synthetic mica found in Germany by United States investigators is reported by them to be as good as natural mica, it contains mixed oxides, fluorides, and silico-fluorides of aluminum, magnesium, iron, chromium and vanadium

YOUR HAIR and Its Care

By Oscar L. Levin, M.D. and Howard T. Behrman, M.D.

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ELECTRONICS-AERONAUTICS

Safer Landings

Will be the result of combining automatic pilot and landing controls. New two-way radio for personal planes will make private flying safer.

➤ A COMBINATION of electronic automatic pilots and automatic landing controls will help airliners make safer landings under weather conditions now called hazardous. A new two-way radio unit for personal planes, which can utilize the outstanding features of both low frequency and very high frequency airways facilities, will make private flying safer. These are two of the important new developments in the aviation field

The new electronic automatic pilot is a Sperry device to replace the hydraulic automatic pilot used in the past These pilots, incorporating automatic airport approach facilities, will soon be installed in transports of the United Air Lines They are not going to replace human pilots, but they will assist, particularly under poor flying conditions

In actual operations, pilots approaching an airport will set the equipment to receive localizer radio signals. Fed from a special very high frequency airplane radio receiver into the electronic automatic pilot, these will lead the plane to the airport runway

At about five miles from the airport, the plane's receiver will begin picking up signals from a glide path transmitter on the airport These will lead the plane automatically down a beam sloping to a point exactly over the end of the airport runway. The human pilot will take over from the automatic pilot at this point and will make the actual landing

From the time the airport localizer signals are picked up until the plane is directly over the end of the runway, the entire operation will be automatic, with the electronic pilot doing the work and the human pilot monitoring the automatic approach by watching a cross pointer on the plane's instrument board and by checking the standard instruments As long as the vertical and the horizontal needles of the cross pointer instrument are at right angles, the plane is on course and is making a proper descent down the glide path to the runway

At cruising altitudes, the electronic pilot will be used much as are the hydraulic pilots. Its controls will be set to maintain cruising elevation and direction

The new two-way personal plane radio is a product of Raytheon Manufacturing Company Transmitter and receiver are combined in a single compact unit, that can be quickly installed or removed Receiver performance, the makers claim, is comparable to commercial airline standards Its superheterodyne circuit incorporates a stage of radio frequency amplification providing extremely high sensitivity to weak signals

The transmitter circuit of the Raytheon radiophone has unusually high output to insure communications over extended ranges and adverse radio conditions. All necessary loading circuits for use on any type aircraft radio antenna are self-contained in the transmitter

Science News Letter, May 4, 1946

ENGINEERING

Coal Turbine Locomotives To Rival Diesel Engines

➤ LOCOMOTIVES powered by coal-burning gas turbines, now in the development stage, can match the cost of diesel-fired locomotives, Dr John I. Yellott of Bituminous Coal Research, Baltimore, told the American Mining Congress in Cincinnati

Methods have already been perfected, he said, to pulverize the coal to the fineness of talcum powder by means of a simple air-operated coal atomizer, and an equally simple apparatus has been developed for removing the fly ash from the products of combustion

With this prime mover, powers of 4,000 to 8,000 horsepower in a single cab are expected. The gas turbine will probably cost less than the diesel It will be able to burn any solid fuel from bituminous coal to lignite, and relieve railroads of any fear of the increasing costs of liquid fuels.

Science News Letter, May 4, 1946

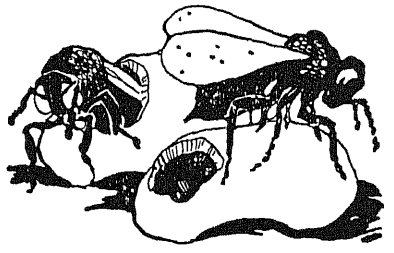
The quill of the condor is probably the stoutest known *feather* of living birds

High temperature seems necessary for the production of *acacia gum,* in cooler climates the trees flourish but do not yield gum.

ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone



Insect Dietary

➤ INSECTS turn up practically everywhere you look, and wherever you find them, you are very likely to find them eating The housewife finds moth larvae chewing up her woolens and furs, ants in the sugar, cockroaches in the garbage-pail, termites in the living-room floor Her sweating spouse, trying to do his civic duty by raising a garden, has to fight potato beetles, squash bugs, cabbage worms, grasshoppers, Japanese beetles, and others too numerous to mention without profanity, while mosquitoes plague his ankles and deerflies bite his neck It should take no argument to convince any citizen that insects will eat anything.

How near that comes to being literally true is vividly set forth in a new book, *Insect Dietary*, by the veteran Harvard entomologist, Prof. Charles T Brues In contrast to the dainty appetites of bees and butterflies that sip flower nectar is the very curious feeding habit of certain beetles, which causes them to chew up the lead in plumbing and the coverings of electric cables. Nothing is too dry for some insects you will find borers in dead wood in the middle of any desert. Nothing is too wet for others, the all-liquid diets of all bloodsuckers like mosquitoes and bedbugs, and of sapsuckers like aphids and cicada larvae, are evidence enough

Insects take what would seem to be awful chances just to get a meal for themselves or their young Spiders by millions are victims of wasps and other predatory species—which would be a case of cat-eat-dog in the mammalian world Poisonous plants like death-cup fungi, henbane and poison ivy are chewed up with apparent impunity by some species; in warmer lands insects devour the leaves and stems of the very plants from which insecticides are derived, like pyrethrum and derris Even the insectivorous plants, like the pitcher-plants and bladderworts, are invaded by insects that seem to be able to eat without being eaten

Some of the most interesting of insects, from the viewpoint of their food habits, are found among the midgets of the hexapod world—the tiny wasps and other creatures that are almost too small to see Their multiform and often highly complex techniques of attaching their eggs to the bodies of their prospective victims, or to their eggs, so that the hatching larvae may become internal parasites, have excited the admiration of naturalists for many years Some of them add a second parasitic twist they fasten themselves to the bodies of their prospective victims, and ride as hitch-hikers to the latters' egg-laying site, to save the labor of looking for it themselves

Science News Letter, May 4, 1946

CHEMISTRY

Relief from Hay Fever By Use of 2,4-D

➤ HAY FEVERITES whose suffering comes from ragweed pollen may get relief this coming August if communities can apply this summer the latest findings on the weed killer, 2,4-D

Laying down a fog of 2,4-D on roadsides, empty lots and other ragweed infested areas on the right date is the way to do it, according to studies reported by Drs Frederick G Smith, Charles M Hamner and Robert F Carlson of the New York State Agricultural Experiment Station at Geneva, N Y , and Cornell University Their findings are reported in *Science* (April 19)

In the first tests, ragweed plants sprayed with 2,4-D on July 26 were either dead or dying on Aug 23 without having shed any pollen Unsprayed plants had developed normally and on that date were shedding pollen as usual The weed killer should be used at a very early stage of flower development which botanists would recognize as being before the involucres are open

Equally good results were obtained when the scientists used a fog machine to apply the weed killer instead of spraying it on The fog machine method promises to be more practical because of lower cost in equipment, swifter application and avoiding the use of large volumes of water.

Other advantages of 2,4-D for ragweed control are that is is relatively non-poisonous and acts on the weeds rather than on grasses.

Science News Letter, May 4, 1946

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• Books of the Week •

CHEMISTRY OF FOOD AND NUTRITION—Henry C Sherman—*Macmillan,* 675 p, tables and illus, $3 75, 7th ed The principles of food chemistry and nutrition with as many of the scientific facts as are deemed important for an effective grasp of the subject, a textbook designed to meet the needs of college students, but which will also be of service to other readers A new edition containing recent advances

COSMETICS AND DERMATITIS — Louis Schwartz, M D and Samuel M Peck, M D *Hoeber,* 189 p, tables and illus, $4 A survey of modern cosmetics and their effects on the skin, an important neglected subject is helpfully handled here by two authorities

DOCTORS EAST, DOCTORS WEST An American Physician's Life in China—Edward H Hume, M D—*Norton,* 278 p, illus, $3 Dr Hume's personal record of building a medical center in Changsha, China, where Chinese and Americans worked side by side in the pursuit and application of medical knowledge

EVOLUTION OF PLASTIC SURGERY—Maxwell Maltz, M D—*Froben Press,* 368 p, illus, $5 A history, covering the entire field, from the Stone Age to the most recent surgical developments

EXPERIMENT IN GERMANY The Story of an American Intelligence Officer—Saul K Padover—*Duell,* 400 p, $3 75 A unique story of Dr Padover's experience as an OSS agent in Germany, where it was his job to investigate the state of mind of an enemy nation at war

THE HOW OF THE HELICOPTER—Alfred H Stevens, Jr—*Cornell Maritime Press,* 58 p, illus, $2 How helicopters were invented, how they fly, how they are flown, how they are used today and may be used tomorrow Text and drawings for teenagers

KEYS TO THE COMMON FLESHY FUNGI—Clyde M Christiansen—*Burgess,* 45 p, illus, paper, $1 50 Designed to be helpful to beginners, amateur and professional, who plan to work in the field alone

LABOR IN THE PHILIPPINE ECONOMY—Kenneth K Kurihara—*Stanford Univ Press,* 97 p, tables and illus, $2 An examination of the task remaining to be done in furthering the welfare of the Philippine people, as a step toward the economic reconstruction of the Philippine Islands. Issued under the auspices of the American Council Institute of Pacific Relations

MODERN PRACTICAL ACCOUNTING: Elementary—Earl A Saliers—*American Technical Society,* 365 p, illus., $4. An introduction to the basic principles which underlie all accounting procedures

OHIO STATE AND OCCUPATIONS—Occupational Opportunities Service, Ohio State Univ—*Ohio State Univ Press,* 198 p, paper, $1 50 A collection of brief descriptions of occupations open to college graduates, classified according to curricula or college major

OUR TREES How to Know Them—Arthur I Emerson and Clarence M Weed—*Lippincott,* 295 p, illus, $3, 5th ed Photographs from nature, with a guide to the recognition of trees at any season of the year and notes on their characteristics, distribution, and culture

RUBBER RED BOOK Directory of the Rubber Industry—*The Rubber Age,* 691 p., illus, $5

SCIENCE, LIBERTY AND PEACE—Aldous Huxley—*Harper,* 86 p, $1 A thoughtful analysis of the individual today and his future in the world

SCIENCE YEAR BOOK OF 1946—J D Ratcliff, ed—*Doubleday,* 245 p, $2 50 A collection of essays on progress during the war years in the fields of physics and chemistry, medicine, agriculture, aviation and other sciences

STRANGE CUSTOMS, MANNERS AND BELIEFS—A Hyatt Verrill—*L C. Page,* 302 p, illus, $3 75 Unique stories of taboos, charms and fetishes, deadly savage weapons, primitive games and musical instruments, odd marriage rites, burial customs, and many other curious viewpoints and practices of man

THIS IS THE PEACE—Violet Anderson, ed—*Bruce Humphries,* 118 p, paper, $1 75 Addresses given at the Canadian Institute on Public Affairs, August 18 to 25, 1945

TREES FOR AMERICA—*American Forest Products Industries, Inc,* tables, paper, free A report of the tree-growing conference in New York on March 1, 1946, sponsored by the American Forest Products Industries, an outline of the objectives of this program and the means by which these objectives may be reached

UNHAPPY MARRIAGE AND DIVORCE—Edmund Bergler, M D—*International Universities Press,* 167 p, $2 50 A psychoanalytic study of neurotic choice of marriage partners

Science News Letter, May 4, 1946

PUBLIC HEALTH

Civilian Amputees Need Rehabilitation Programs

➤ REHABILITATION programs are needed for civilian amputees no less than for salvaged battle casualties, members of the American Philosophical Society were told by a physician-journalist, Dr. Howard A. Rusk, associate editor of the New York Times. As a colonel in the Army Air Force during the war, Dr. Rusk set up the first rehabilitation program for disabled fighters and thus initiated a movement that has been highly successful

"Few Americans realize that for every disabled soldier there are scores of equally or more severely handicapped civilians," Dr. Rusk declared "From Pearl Harbor to V-J Day there were approxi-

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mately seventeen thousand amputations in the Army, but during that same period there were over 120,000 major amputations from disease and accidents among our civilian population Each year over 350,000 Americans become permanently disabled by accident alone"

That physically handicapped persons are anything but human wreckage was decisively demonstrated during the war, the speaker indicated. Then, because of manpower shortage, many thousands of them got jobs that had previously been denied them They showed themselves competent, and had a lower absentee record than that of their more fortunate brethren at the same benches

Dr Rusk called for a comprehensive program of rehabilitation for handicapped civilians·

"Funds and authority for bringing comparable opportunity to America's civilian handicapped are available, but there are not sufficient facilities with trained personnel, experience and equipment to do the actual work

"Preventive medicine and curative medicine and surgery have made great advances The third phase of medical care—rehabilitation and convalescence care—must be expanded to bridge the gap now existent from the bed to the job and normal activity"

Science News Letter, May 4, 1946

GENERAL SCIENCE

Science-Government Cooperation Praised

➤ HERE'S ANOTHER great war-science achievement that ranks with the atomic bomb and the proximity fuze·

"A working relationship between central government and highly qualified scientific and technical people" which makes possible the discoveries

This wartime cooperation must continue for the development of science in peacetime, Dr M L Tuve, head of the department of terrestrial magnetism of the Carnegie Institution of Washington and former director of one section of the proximity fuze project, told the National Academy of Sciences meeting

Describing the organization that produced the fuze, termed America's No 2 secret weapon, Dr Tuve declared that the important thing we learned during the war is the need during peace for this mechanism

Far more than our military establishments is involved, Dr Tuve said The Office of Scientific Research and Development contract program, he cited, showed how specifically qualified individuals as a whole participate effectively in decisions and actions of the national government without losing their diversity of status and viewpoint as members of the general civilian community outside of the government

Science News Letter, May 4, 1946

GENERAL SCIENCE

Atomic Scientists Among Guggenheim Winners

➤ FIVE ATOMIC scientists are among the 132 persons receiving fellowship awards totalling $360,000, the John Simon Guggenheim Memorial Foundation has announced

Japanese-born Dr Shuichi Kusaka, a U S Army pfc, is one of the winners Dr Kusaka plans to work with Dr J Robert Oppenheimer at the California Institute of Technology and with Dr Wolfgang Pauli of the Institute for Advanced Study, Princeton, N J.

Other atomic scientists receiving Guggenheim Fellowships are Dr William George McMillan, Jr, Institute of Atomic Physics, University of Chicago, who worked on the Manhattan District, Dr Robert L Platzman, Metallurgical Laboratory, University of Chicago, who plans to work with Prof Niels Bohr at the University of Copenhagen, Copenhagen, Denmark, Dr James Alfred Van Allen, research physicist at Johns Hopkins University, who will go to the University of California, Berkeley, Calif., and Dr Wayne Eskett Hazen, University of California

Dr Hazen will make a study of cosmic rays at extremely high altitudes in unmanned balloon flights and in high altitude airplane flights, the Foundation reported

Forty-one other scientists are among the fellowship winners

Science News Letter, May 4, 1946

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New Machines And Methods

⚙ *EYE TRAINER, for developing accurate split-second seeing, is a box with a screen on which numbers are flashed before a trainee at exposures ranging from one second to 1/400 of a second The trainee is started with four-digit numbers, but as perception improves, is given longer numbers at shorter exposures.*

Science News Letter, May 4, 1946

⚙ *VEST-POCKET slide rule, circular in shape, has an outer scale, an inner scale and a "finder" It gives the square root, the logarithm and reciprocals of all numbers, "trig" scales give the sines and tangents of numbers It is made of a nearly unbreakable plastic*

Science News Letter, May 4, 1946

⚙ *POCKET adding machine, the size and shape of a fountain pen and with a pencil point if desired, has on its cylindrical barrel a series of identical number wheel units which may be revolved with the fingers Through gears these operate the mechanism that performs the addition and gives the proper answer*

Science News Letter, May 4, 1946

⚙ *FEATHERWEIGHT material, of great strength beneath a mirror-like exterior, has been developed for use in aircraft construction It is made of two thin sheets of aluminum bonded to a separating core of balsa wood. The smoothness of its finish is indicated by the reflection in the picture*



Science News Letter, May 4, 1946

⚙ *RADIO RECEIVER not only picks up ordinary programs but also can be used to talk to someone with a similar receiver in another room It is merely plugged into the nearest electric light socket, and operates on the principle of carrier-currents Each instrument in use becomes a radio-frequency transmitting station*

Science News Letter, May 4, 1946

⚙ *TIRE TRACKS, to put under automobile wheels in mud or snow, are made of hinged steel pieces with non-slip tractive surfaces, and may be folded when not in use When open they make a track 50 inches long and 12 inches wide*

Science News Letter, May 4, 1946

⚙ *COLD STARTING fuel for aircraft operating in subzero temperature slices the time required for preparation and starting to about two minutes It is made from the low-boiling fractions of gasoline and is used in the regular aviation carburetor and priming system during the starting period only.*

Science News Letter, May 4, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 909.*

Question Box

CHEMISTRY

How is synthetic rubber made from soapy water? p 278

How may 2, 4-D relieve hay fever? p. 285

What is the new food dehydrating process? p 279

What is the source for the newly-discovered anti-biotic? p 278

What are the circumstances behind the development of DDT? p 275

ELECTRONICS

How does ELMER clear landing fields? p 276

ENGINEERING

What is vacuum concrete used for? p 280.

GENERAL SCIENCE

What well-known Russian physicist was elected a Foreign Associate of the National Academy of Sciences? p 274

GEOLOGY

Where has a "grand canyon" been discovered? p 281

MEDICINE

Which strain of penicillin is least effective in the treatment of syphilis? p 277

PHYSICS

What are the possibilities for an atomic powered Navy? p 275

What is the new aid for weather prediction? p 281

What scientific secrets may be explained by exploding atoms? p 282

TECHNOLOGY

What advance has been made in the production of carbon from anthracite? p 278

VETERINARY MEDICINE

What prevalent dairy cattle disease will penicillin cure? p 280.

Where published sources are used they are cited.

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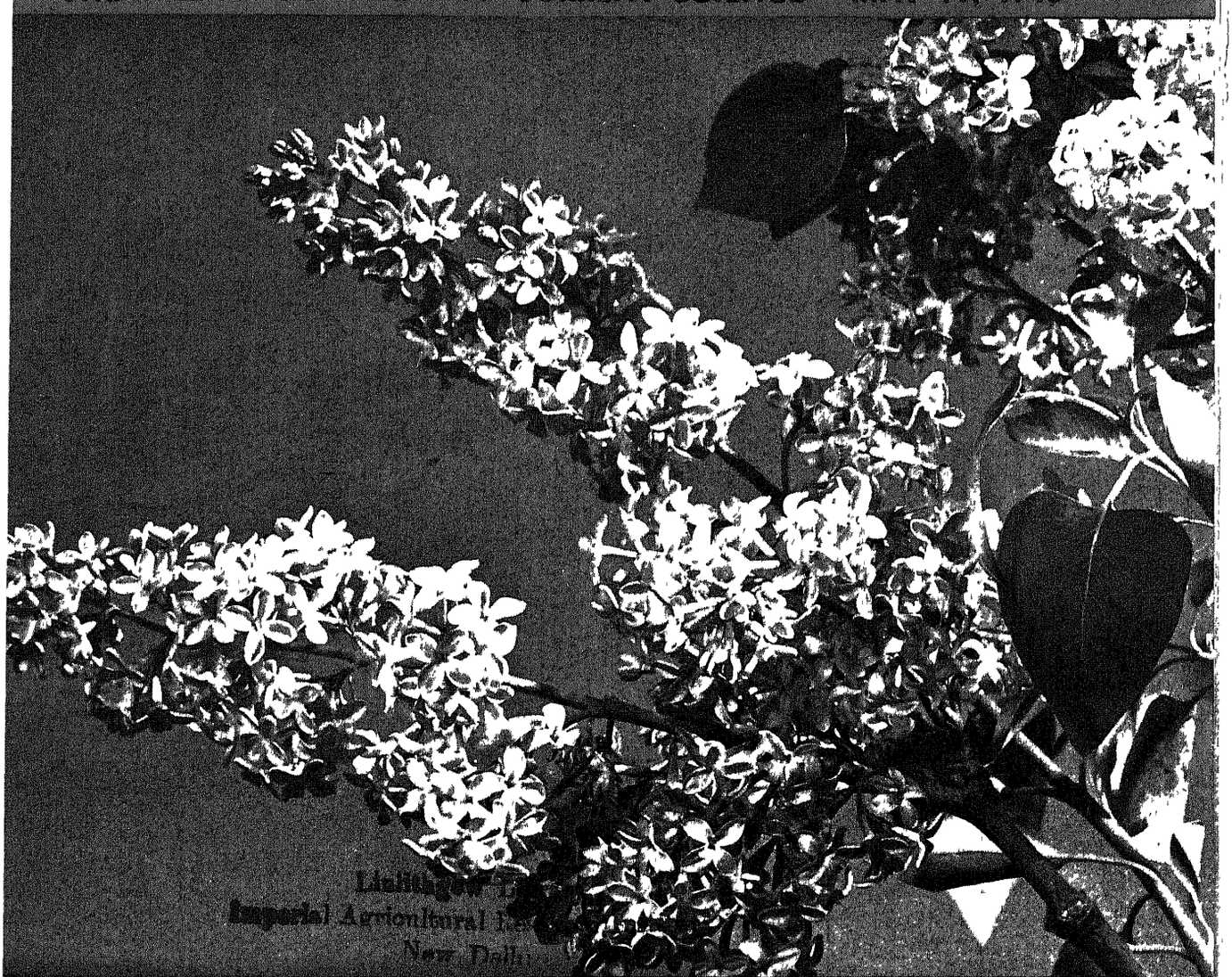
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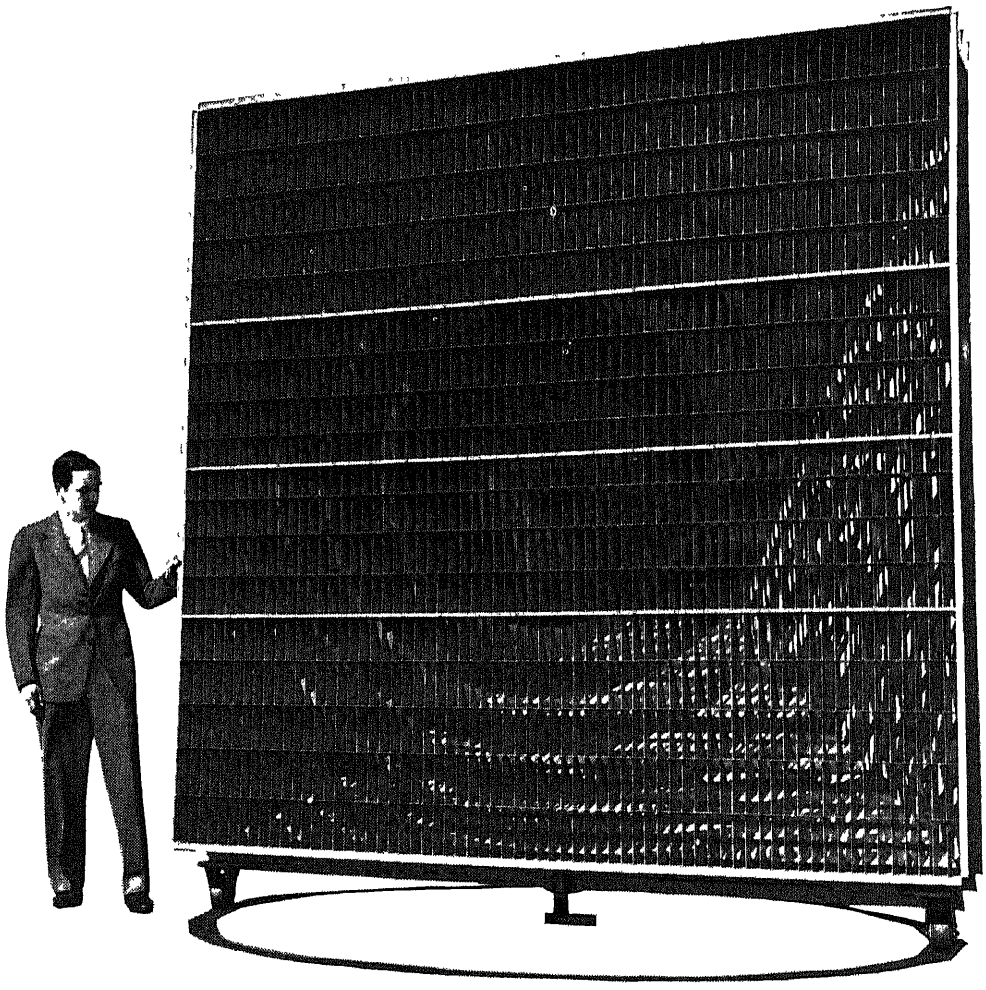
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Synthetic Scent

See Page 298

A SCIENCE SERVICE PUBLICATION

1921 TWENTY FIFTH ANNIVERSARY 1946



• A "SEARCHLIGHT" TO FOCUS RADIO WAVES

In the new microwave radio relay system between New York and Boston, which Bell Laboratories are developing for the Bell System, giant lenses will shape and aim the wave energy as a searchlight aims a light beam

This unique lens — an array of metal plates — receives divergent waves through a waveguide in the rear As they pass between the metal plates their direction of motion is bent inward so that the energy travels out as a nearly parallel beam. At the next relay point a similar combination of lens and waveguide, working in reverse, funnels the energy back into a repeater for amplification and retransmission.

A product of fundamental research on waveguides, metallic lenses were first developed by the Laboratories during the war to produce precise radio beams.

But how to focus waves is only one of many problems that Bell Telephone Laboratories are working on to speed microwave transmission. The goal of this and all Bell Laboratories research for the Bell System is the same — to keep on making American telephone service better and better

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PHYSICS

New-Type Atom Smasher

The 300 million electron volt synchrotron will eventually enable scientists to fire atomic bullets of one billion electron volts.

➤ A 300 MILLION electron volt synchrotron, the powerful new-type atom-smashing machine based on a revolutionary principle which eventually will enable scientists to fire atomic bullets of one billion electron volts, will be completed at the University of California early next year, Prof Ernest O Lawrence, director of the Radiation Laboratory, announced It is being constructed with the assistance of the Manhattan District

The synchrotron, combining features of the cyclotron and the betatron with the new principle, will accelerate electrons as projectiles It is hoped, with the almost incredible new energies, that it will be possible not simply to "smash" the atomic nucleus, but to split the particles —protons and neutrons—which are the basic building blocks of the nucleus

Since the projectiles themselves will be in the energy ranges of cosmic rays, it will be possible to create these fundamental radiations for close study in the laboratory Thus scientists will cross into a new unknown of atomic research, a seven-league stride closer to understanding the elemental forces of the universe.

Devised independently by Prof Edwin M McMillan, co-discoverer of neptunium, and the Russian scientist, V Veksler, the synchrotron principle was said by Prof Lawrence to be as important a development in atom-smashing as was the cyclotron In a recent letter in *Physical Review,* Veksler said he is supervising construction of a 30 million electron volt synchrotron in Moscow

This principle is what Prof McMillan calls the theory of phase stability It bypasses part of the theory of relativity which imposes limitations on the energies which can be reached in the acceleration of particles Relativity predicts that as particles reach higher energies their mass increases and they tend to slow down In the cyclotron this meant that atomic bullets, when they reached very high energies, would fall out of step with the regularly-spaced high-frequency electrical pushes applied to speed them up Arriving too late at the accelerating point, they would be out of phase and receive no push

Like a mechanical drill sergeant, the synchrotron will be able to march electrons around a circular orbit an indefinite number of times, keeping the projectiles in perfect step with the high-frequency pushes This will be done by increasing the magnetic field of the machine's electromagnet as the particles reach higher energies Thus the increased magnetic force will jerk lagging projectiles up to the acceleration point exactly in time to receive a new push

Theoretically, there is no limit to the number of times the synchrotron can "call the turn" Practically, the energies achieved will be limited by the strength of the field which can be created by the electromagnet When the speeding particles reach a certain energy the magnet can no longer exert the necessary force to jerk them up to the acceleration point, and the relativity limitation becomes effective

In the University of California synchrotron this point will be reached at 300 million electron volts Prof McMillan said that he believes present knowledge of electromagnets will permit construction of one which could be used to accelerate electrons to a billion electron volts

The synchrotron will be doughnut-shaped, hollow in the center The laminated transformer-steel electromagnet will weigh 135 tons, and its maximum field strength will be 10,000 gauss The orbit of the acceleration tank between the poles will be one meter The tank will have one C-shaped accelerating "dee"

The machine will operate up to two million electron volts as a betatron, the sheer force of the magnetic field driving the particles around the tire-shaped tank At 300 million electron volts the electrons will have circled the tank 200,000 times before emerging as a beam, and the particles will weigh 600 times as much as they do at rest

By comparison, Prof Lawrence's new cyclotron has a magnet weighing 400 tons, and an accelerating tank 184 inches in diameter

Prof McMillan's theory of phase stability will be applied to this huge machine to achieve higher energies with



COUNTS BIKINI FISH—To get an accurate and scientific survey of fish in the Bikini Lagoon, Vernon E. Brock, director of Fish and Game for the Territory of Hawaii (right) and Ensign Richard Cron, Houston, Texas, use an undersea camera. Some species never before classified have been found at Bikini. Joint Army-Navy Task Force One photograph.

heavy particles—protons, deuterons and alpha particles The application will differ from that in the synchrotron Instead of altering the magnetic field to keep the particles in step, the frequency of the accelerating electrical impulses will be changed, coming at slightly longer intervals in order to hit the lagging projectiles as they arrive at the acceleration point This is called frequency modulation Prof Lawrence has estimated that the giant cyclotron, which was started prior to the war and designed to accelerate deuterons to 100 million electron volts, will be able to produce deuterons of double this energy as a result of Prof McMillan's theory

The Russian, Veksler, published his theories in Russia before Prof McMillan's first article on the subject was printed in the *Physical Review* last September However, with communications what they were under wartime conditions, Veksler's articles were not known to Prof McMillan until two months after he sent his letter to the *Physical Review* Prof McMillan was working at the University of California atomic bomb factory at Los Alamos, N Mex., when he formulated this theory of phase stability Prof Lawrence stated that the Manhattan District has given every encouragement to the development of the synchrotron with the purpose of maintaining the pre-eminence of American fundamental science

Science News Letter, May 11, 1946

ENGINEERING

Rocket Devices Patented

Nine patents have recently been granted to the late Prof. Robert H. Goddard. A hydro-pneumatically controlled automatic steering apparatus for aircraft is included.

➤ ROCKET DEVICES invented by the late Prof Robert H Goddard of Clark University and Roswell, N Mex., are beginning to be made public through the issuance of U. S. patents Nine such patents, for which applications were filed during or before the war, have been granted during the past few weeks

One of them is a design for what might be called a rocket landing-strip to receive, if not space-ships from Mars and Jupiter, at least the ultra-high-speed stratosphere craft which rocket propulsion may make possible Essentially, this device is really a big tube closed at one end, and with a trumpet-like flare at its open end The rocket-craft is expected to enter this like a ferry going into its slip, wheels at various points on its circumference help to guide it smoothly As it passes into the narrower part of the tube it will practically fill it, and will thus act as the piston in a grand-scale pneumatic shock absorber. As its nose reaches the closed end it will contact a final checking device built on the principle of the recoil cylinder under an artillery piece.

Several of the patents cover variations in the Goddard fuel system, which is based on the use of the combustion of gasoline or other hydrocarbon fuel with liquid oxygen A tank of liquid nitrogen is also carried, to fill the empty space created in the gasoline tank as the latter is used up

Prof. Goddard was especially concerned with keeping the temperature of the combustion chamber within manageable limits In several of his designs, this is done by wrapping around it a helical coil from the liquid nitrogen tank. The liquid nitrogen thus heated passed as a gas under pressure to the gasoline tank Some of the combustion chambers revolve as the fuel burns; ribs or baffle-plates within them mix the fuel and oxygen more thoroughly Another design calls for a triple-walled combustion chamber.

Included among the nine patents are an exploratory research rocket, to be propelled by a series of explosive charges, automatically fed from a tubular magazine and set off in series; also a hydro-pneumatically controlled automatic steering apparatus for aircraft

The patents are numbered, inclusively, 2,395,113—2,395,114, 2,395,403—2,395,406 and 2,396,566—2,396,568 Half-rights in all patents are assigned to the Guggenheim Foundation

Science News Letter, May 11, 1946

MEDICINE

$5,000 Awarded for Virus Research Technic

➤ DR ERNEST W GOODPASTURE, professor of pathology and dean of the School of Medicine of Vanderbilt University, Nashville, Tenn , will receive the $5,000 Passano Foundation Award on May 15 for his discovery of a method of growing disease viruses on chick embryos

The vaccine which has protected American troops against typhus fever, and improved defenses against influenza, smallpox, yellow fever, fowlpox and rinderpest through vaccines are among the results of Dr Goodpasture's discovery.

The Passano Foundation was established in 1944, by the Williams and Wilkins Company, medical publishers, "to aid in any possible way the advancement of medical research," especially research promising clinical application

Science News Letter, May 11, 1946

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MEDICINE

Who Gets Streptomycin

Typhoid, rabbit fever, a special kind of heart disease and undulant fever are among the nine diseases which will be treated with the drug.

➤ PATIENTS with typhoid fever, a special kind of heart disease, and tularemia or rabbit fever, are among those who may get streptomycin from the present very limited supplies of this antibiotic drug

Acute brucellosis, also called undulant fever or Malta fever, with bloodstream infection, is another of the nine diseases which a National Research Council committee includes on the list for which it will allocate supplies of streptomycin for clinical investigation

The special heart disease is bacterial endocarditis due to infection with gram negative bacilli. Penicillin is not very active against gram negative bacilli or bacteria, which is one reason for trials of streptomycin in such infections.

Gram negative infections of the kidneys and bladder resistant to sulfa drugs, and other infections with such germs causing blood poisoning, will be investigated with streptomycin treatment

Paratyphoid fever, a relatively rare kind of pneumonia due to Friedlander's bacillus and pneumonia, meningitis, middle ear disease and laryngo-tracheitis when due to a germ called *Hemophilus influenzae,* complete the list of diseases to be studied This last germ, in spite of its name, is not the virus causing influenza.

Leukemia, cancer, fever of unknown cause, rheumatic fever, rheumatoid arthritis, chronic idiopathic ulcerative colitis and lupus erythematosis acutus disseminatus, which is a chronic skin disease, will not be studied at present, Dr Chester S Keefer, chairman of the committee, reports (Journal of the *American Medical Association,* May 4)

Only those patients with tuberculosis who were getting streptomycin before March 1, 1946, will be included in the study, although the committee hopes to extend the study of streptomycin in tuberculosis when a larger supply of the drug is available

Patients with the diseases and infections on the list for study will get streptomycin only if they are under the care of certain accredited hospital physicians or if their own physicians comply with regulations for furnishing full information about the case to the committee

No patient who does get streptomycin may pay for it, nor will any physician be charged for it Grants in aid from 11 pharmaceutical and chemical companies are supporting the study of the committee and will pay for the drug

Science News Letter, May 11, 1946

NUTRITION

Calorie-Cutting Effects

Depend on time, body fat, size of cut. No sharp line between how many calories a day are required and how many are extra or desirable for best health.

➤ AMERICANS going on a calorie-cutting diet to save food for hungry Europeans will feel the effects according to· 1 how drastic the calorie-cut is, 2 how long it is continued, 3 how much reserve of fat and protein is stored in their bodies

No sharp line can be drawn between how many calories a day are absolutely required and how many are extra or desirable for the best health A person can get along on practically no food at all for a week or so Shipwrecked men have gone for weeks with no food at all and survived, though they may have been almost dead when rescued

A daily ration of 1500 calories is considered about the least on which life can be maintained with any sort of health over any length of time Yet many overweight persons have lived for weeks and months on reducing diets, prescribed by physicians, which furnished far fewer than 1500 calories per day. These people were able to eat less calories because they were living partly on the calories from fat stored in their bodies

Scientists, in recent years particularly, have been more concerned with finding the best diets for good health than with learning how little food people can live on During the war, however, Dr Ancel Keys and associates at the University of Minnesota studied the effects of starvation on 34 normal young men.

These previously normal men lived for six months on a European type of famine diet Instead of the 3200 calories daily they required for good health they existed on 1790 calories a day. Their daily diet had less than one ounce of fat and less than two ounces of proteins from meat or fish, or eggs or cheese or milk

They felt cold and hungry and depressed They lost one-fourth of their body weight Their muscles became so weak after 24 weeks on the diet that they could only run 52 minutes on a motor-driven treadmill, although before going on the diet they could run for over four hours before becoming exhausted

Dutch children during the last seven months of the war had their rations cut to 700 calories daily. These children lost weight, became anemic, failed to grow at the normal rate and their bones were decalcified They complained of pains in the legs and could walk only with difficulty, Dr J H P. Jonxis, of the Children's Hospital at Rotterdam, reports. The children were more susceptible to infection

About five times as many children between one and five years died as normally would have They did not die because they were starved to death, however. Bad hygienic conditions and lack of hospital beds were the chief causes of the deaths, especially of those children who died of diphtheria and dysentery Even well-fed children, Dr. Jonxis reports, died of severe dysentery.

The effects of short rations depend not only on the number of calories in the daily diet but on the amount of protein, vitamins and minerals.

The men who voluntarily went on a famine diet at the University of Minnesota showed little or no signs of vitamin lack. The Dutch children also rarely showed signs of striking vitamin lack. Vitamin A was the only lack which was striking in a great number

Americans who voluntarily cut their daily rations to share food with the hungry in Europe can guard against vitamin lack by planning their diets carefully as medically prescribed reducing diets are planned.

Science News Letter, May 11, 1946

MEDICINE

Radiation Injury Study

Finding swift methods of detecting atom bomb blast injury, best methods of treating it, and what after-effects to expect to be undertaken at Bikini.

➤ A NEW kind of blast injury, radiation blast of the atom bomb, will be studied, with the hope of learning how to reduce its danger to personnel, during the Crossroads Operation of Joint Task Force One

Finding swift methods of detecting radiation injury, the best methods of treating it, and what late after-effects to expect are other parts of the mission of the Naval Medical Research Section of Joint Task Force One, Capt R H Draeger, who heads this section, and Capt Shields Warren, who will assist him reported as they made their plans at the Naval Medical Research Institute in Bethesda, Md

The atom bomb, unlike any other weapon of warfare, can produce four blast effects, any one of which can kill These are air blast, water blast, solid blast and radiation blast The first three can be produced by ordinary high explosives, depending upon whether the explosion is in air, in water or in contact with a solid structure such as a ship.

Radiation blast, however, is produced only by the atom bomb These blast radiations carry thermal and electromagnetic energy, producing burns or radiation sickness An A-bomb victim who escaped the other blast effects might walk around apparently unharmed and without pain for 48 hours, and then suddenly collapse and die

To prevent this happening in case of atomic attack, Capt Draeger, Capt Warren and their associates hope to learn during the Crossroads Operation what is the best way of telling quickly just how much radiation a man has absorbed in his body Individuals working in laboratories where there may be radiation or radioactive hazards employ various devices for recording radioactivity From these devices it is possible to tell whether or not the individual workers are in danger of getting too much radiation One of the answers being sought in the tests will be to see whether more sensitive or more exact devices may be needed to indicate quickly enough the need for special medical treatment of atom bomb victims Special blood tests may prove the best method of swiftly diagnosing radiation injury from atom bombs. A team of technicians has been, for weeks, getting special training in such blood testing at the Naval Medical Research Institute

Penicillin, liver extract, iron compounds, chemicals derived from the blood's hemoglobin, and one of the new vitamins, folic acid, will all be tested as remedies for victims of the radiation injury of atom bombs The blood and blood-forming organs are known to be damaged by radiation, which is the reason for testing as remedies such aids to blood formation as iron, liver, folic acid and hemoglobin derivatives Penicillin, Capt Warren believes, might prove lifesaving by holding disease germs at bay while the victim was suffering from too few white blood cells and until enough new ones were formed to give him some natural resistance to infection

Whether the radiation injury from atom bombs will cause sterility in the victims or cause defects in such children as they might have will also be studied. While it will take many years before such genetic effects could be determined from following atom bomb survivors in Japan, laboratory animals and insects, such as drosophila, can provide the answers much faster

The holds of the U.S S Burleson, which will be the laboratory ship for the Naval Medical Research Section of Joint Task Force One, are being converted into pens and suitable living quarters for fruit flies, goats, pigs, rats and a few specially bred mice

The mice, provided by the National Cancer Institute, are from strains known to be highly susceptible to cancer, as well as from a resistant strain. They are being taken along so that scientists can learn what effects atom bomb radiation may have on cancer susceptibility or even on cancer itself The goats were chosen for their unusual blood, which contains more and smaller red cells than other species, including humans, and thus will provide more material for studying the effects of radiation on the blood The pigs were chosen because their skin is so much like human skin in its response to radiation.

An expert statistician, Capt. F. R. Lang of the Navy, will be among the 21 officers attached to the Naval Medical Research Section on the Crossroads Operation Of the 21 officers, five are from the Army. The Chemical Warfare Service of the U. S Army and the Biological Warfare Division are represented In addition, there will be three civilian scientists Among the 68 enlisted men will be 40 picked because they came from farms and have had experience with animals Veterinarians are of course included in the force

Seeds and soils will also be studied in collaboration with the Department of Agriculture, to learn how atom bomb radiation affects a region so far as its future crop production and habitability are concerned

Science News Letter, May 11, 1946

ORDNANCE

Faster, More Powerful Rocket Motor Revealed

➤ WORLD'S NEWEST and most powerful rocket motor was unveiled at Patuxent River Air Station, by the Navy with a promise of greater distances and speeds than ever before reached by jet-propelled weapons.

The new motor would send the Navy's now-famous "Tiny Tim" rocket speeding through space at three times the speed previously possible for the missile

Developed by Aerojet Engineering Corp, Pasadena, Calif, the new motor has been romantically dubbed "Moby Dick"

The thrust developed by the motor is greater than 30 tons, or one-third more than the "push" behind the Germans' V-2 rockets. It would shoot a "Tiny Tim" rocket at more than 2,700 feet per second contrasted with present speed of 900 feet per second, Navy rocket experts predicted

Although "Moby Dick" is still in the experimental stage, new fields of distances and speeds for rocket weapons are expected from the latest advance

Less powerful than "Moby Dick," but regarded as an important military advance is another rocket engine that was demonstrated by the Navy Bureau of Aeronautics The compact, liquid-fuelled engine, known as CML, 2N, delivers a thrust of 350 pounds and fires for over two minutes It was developed for the Navy's high-speed Gorgon pilotless aircraft.

Science News Letter, May 11, 1946

All *lawns* need spring care because turf grasses are cool-weather growers.

PHYSICS

Radio Waves Absorbed

Water and oxygen in the atmosphere absorb very short radio waves and the propagation of radar signals is affected as a result.

➤ VERY SHORT radio waves are absorbed in the atmosphere by water vapor or oxygen and the propagation of radar signals is affected as a result

This war discovery, made at the Radiation Laboratory of the Massachusetts Institute of Technology, was announced to the American Physical Society at its first postwar radar meeting in Cambridge, Mass

Molecules of water in the atmosphere and the oxygen in the atmosphere both absorb and radiate what might be thought of as spectral lines in the microwave region Light that we see and the invisible light that can be photographed is all caused by the way in which the atoms themselves vibrate or resonate

The bright yellow line of sodium vapor in the lamps that are sometimes used to light highways is a good example of the kind of light that is given out by atomic resonance of one kind of atom, that of sodium The water vapor and the oxygen molecules in a very similar way absorb and emit certain wavelengths of radiation in the range of the very short radio waves

This is not too surprising since light, whether infra-red, visible, ultraviolet or X-rays, is the same kind of radiation as the radio waves except that they are much shorter in wavelength, that is, higher in frequency

In the case of water and oxygen molecules, they are whirling around and they are made to whirl faster when the radio waves are being absorbed This is what is called resonance The amount of energy involved is very small indeed

Water vapor molecules absorb a wavelength of one and a quarter centimeters, while the oxygen molecules absorb a wavelength of half a centimeter. These waves are mere fractions of an inch and much, much shorter than the waves used in ordinary broadcasts These studies are important in radio transmission because the water and the oxygen in the air do absorb a considerable amount of the energy, and that affects the transmission

Among the physicists presenting papers on these researches were Dr L A DuBridge, of the University of Rochester and during the war director of the Radiation Laboratory, Dr J H Van Vleck of Harvard, Dr Robert Beringer, now of Yale, Dr R L Kyhl, of the Radiation Laboratory, Dr R H Dicke, now of Princeton, and Drs Stanley H Autler, Gordon E Becker and J M B Kellogg of Columbia University's Radiation Laboratory

Science News Letter May 11, 1946

AERONAUTICS

Flying Wing Bomber Looks Like Giant Boomerang

➤ THE NEW GIANT Flying Wing bomber and cargo plane, that looks like a gigantic boomerang, is ready to fly It is all wings, no tail and no familiar fish-shaped body

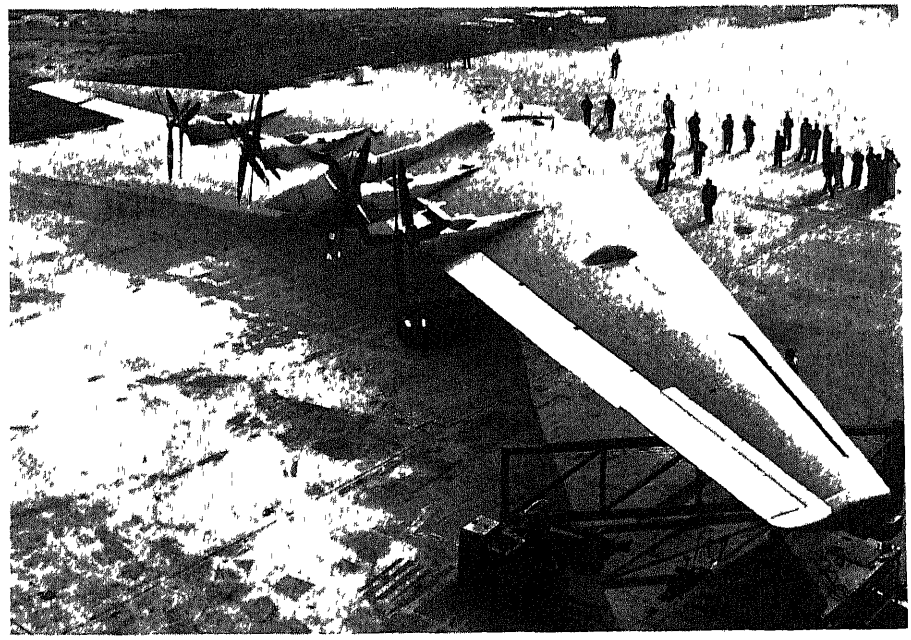
Two broad wings, joined at their bases, form a widespread V Four pusher propellers are within the angle of the wings A few "bubbles" on the upper surface house defensive armament in the bomber version

The nose of the plane is the front junction of the wings The four engines are carried toward the rear of the wings in submerged housings which do not protrude from the surface Crew and cargo are carried within the broad thick wings themselves

The Flying Wing is the nearest approach to an airplane consisting only of a pure supporting surface Almost every portion of it contributes to lift in return for the drag it causes Lift, the raising force on the wings of an airplane, enables it to fly, and the more lift it has, the better able it is to carry loads The aim of aircraft designers has always been to obtain more lift and less drag In the conventional plane only the wings contribute to lift, the fuselage, tail, and all other extraneous parts create drag

This new plane, the successor of several experimental models, will be known as the Northrop Flying Wing or the Army XB-35 It was built by Northrop Aircraft, Inc., for the Army as a giant bomber However, it can be easily converted into a cargo ship, and some day may become a familiar commercial cargo-carrier

Science News Letter, May 11, 1946



***ALL WINGS**—Four eight-bladed co-axial propellers, driven by four Pratt and Whitney Wasp Major engines, are expected to push this Northrop Flying Wing XB-35 long-range bomber along at high speed. Wing tip nearest the camera shows one of the wing slots which aid the Flying Wing's efficiency at slow speeds. At high speeds, where the slots are not needed, automatic doors close over them, "streamlining" the smooth surface.*

MEDICINE

Pituitary Gland Implicated In Search for Cancer Cause

➤ POSSIBILITY that the pituitary gland is involved in the cause of cancer is being explored by Dr. Henry K Wachtel of the Cancer Research Laboratories at Fordham University

The pituitary is a small gland located in the head but it has far-reaching effects on body chemistry and functions Fatty extracts from the pituitary glands of cattle caused cancer in more than one-fourth of a group of 67 white mice injected with the extracts, Dr. Wachtel reports (*Science,* May 3) The cancer-causing power of these extracts, however, is evidently low, Dr. Wachtel states

The experiments are part of a search for the cause of cancer which many scientists the world over started when it was discovered that chemical substances from coal tar could cause malignant growths

These cancer-causing chemicals are related to some chemicals normally present in the body, such as hormones produced by glands One theory of cancer cause has been that something went wrong with the body chemical processes so that cancer-causing chemicals were produced or developed from the harmless ones

Science News Letter, May 11, 1946

ELECTRONICS

Focusses Radio Waves Into Sharp Beam

➤ A NEW METAL lens, which can focus radio waves into a sharp beam much as a glass lens focusses light, will give impetus to microwave communication, it is expected, and will find its most widespread application in microwave radio relay systems It is announced by the Bell Telephone Laboratories where it was developed.

The relay systems in which the new lens will be used are designed primarily as adjuncts to the telephone network, but they are expected to be used in transmitting pictures, radio broadcasts and television programs Aside from its use in such microwave communication systems, the lens is also expected to be of value in the peacetime development of radar as an aid to sea and air navigation

The necessity for relay stations in microwave communications is due to the fact that these very short waves, unlike longer commercial broadcasting waves, do not follow the curvature of the earth but shoot off into space. They can be transmitted only as far as there is a clear, unobstructed, straight-line path, at best as far as the horizon In the new channel between New York and Boston, for example, there will be eight jumps To obtain this short-range transmission between successive relay stations with peak efficiency and least interference, the wave energy must be focussed into a narrow beam

This new lens for radio waves bears no resemblance to familiar optical lenses It is an array of metal plates These plates are designed to focus the radio waves as effectively as a solid lens might focus them if due regard is given to the fact that the edges of the wavefront is advanced rather than retarded in transit The plates are built to duplicate the action not only of convex and concave lens but also of other optical devices, such as half and quarter wave plates and prisms

Science News Letter, May 11, 1946

ENGINEERING

Two New Solvents Clean Fouled Engines

➤ FOULED AUTOMOBILE engines, crankcases, and lubrication systems can now be better cleaned, it is claimed, without taking them apart, by the use of two improved cleaning solvents announced by the Standard Oil Company of Indiana One is designed to remove loose crankcase sludge and clean oil screens and passages; the other is to remove varnish, gum and carbon deposits from engine parts, remove combustion chamber deposits, and clean fouled spark plugs.

Both new products have high solvent powers for resins and gums formed by deterioration of motor oil and low volatility with high flash point They will be known by the trade names Stano-Purge and Stano-Vim The first is the crankcase cleaner, the second the engine cleaner Stano-Purge is more than 90% a material chemically related to toluene to which is added a lubricant to prevent injury to the engine during the use of the solvent.

Stano-Vim is a low-viscosity, low volatility fluid with a mothball-like odor. It is not claimed to be the first fluid developed for cleaning engines, but it is claimed that it has unusually high solvent effect on resins and gum It is not suitable for use in supercharged engines or in engines fed by injection.

Science News Letter, May 11, 1946

IN SCIENCE

GENETICS

Cancer and Hair Color Found Linked in Mice

➤ INBORN SUSCEPTIBILITY and resistance to cancer are linked with hair color, at least in mice, Dr Leonell C Strong of Yale University School of Medicine has found.

He crossed black and brown mice and injected the offspring with a cancer-causing coal tar chemical, methylcholanthrene The results showed that the chromosome that carried the gene determining black hair color also carried the gene determining that the mice would be susceptible to cancer induced by methylcholanthrene.

The genes that determine cancer resistance or susceptibility in mice apparently obey the same laws of Mendelian heredity as the genes that determine hair color and other inherited characteristics, Dr Strong states (*Science,* May 3)

Mice are not men and the findings may not apply at all to cancer in humans. However, they seem to be bringing scientists closer to full knowledge of the genetic or constitutional factors that may be involved in the development of cancer.

Science News Letter, May 11, 1946

ICHTHYOLOGY

Razor Clams Caught By Using Table Salt

➤ SALT CAN BE used to catch razor clams

By waiting until the sandbar in which they live is mostly out of water, several dozen clams have been caught by merely sprinkling table salt along the bar, Robert Alexander states in *Frontiers,* a magazine of natural history. The clams appear at their holes and push themselves in jerks until their long narrow shells lose balance and fall over. By the time the turned tide has covered the bar with water, the clam-seekers have a well-filled basket

When the salt seeps down into their holes, the mollusks come out. Some believe the salt irritates them so much they leave their holes to get away from it But if they should dig down into the sand and escape, no amount of salt will induce them to return to the surface

Science News Letter, May 11, 1946

FIELDS

MEDICINE

Penicillin X May Fail When Swallowed

➤ PENICILLIN X, an especially powerful penicillin for checking disease germs, may fail to cure a patient if he swallows the drug instead of getting it by hypodermic needle injection

Tests showing this are reported by Drs Manson Meads, Edwin M Ory and Maxwell Finland, of Boston City Hospital and Harvard Medical School (*Science*, April 26)

Germs causing gonorrhea, meningitis and blood poisoning were from two to eight times more vulnerable to penicillin X than to penicillin G, the doctors found from test tube experiments comparing commercial lots of penicillin containing more G or more X

Injections of penicillin X gave a higher level of penicillin activity in the blood than injections of penicillin G But when the two kinds of penicillins were swallowed, the effect was reversed The results suggest that penicillin X is not absorbed as well as penicillin G when given by mouth

Science News Letter, May 11, 1946

NUTRITION

Fight for Bread Is Fight for Vitamins

➤ GOVERNMENT officials and others fighting to get most of our shortened wheat and flour supply baked into bread instead of cake and pie are fighting to keep us as well nourished as possible.

White bread and rolls, even though faintly gray at present, supply more vitamins, iron and protein than cake and pie

Slice for slice, a piece of cake or pie might furnish more calories than a piece of bread, because of the extra fat and sugar in the pie or cake It would furnish less protein, however, because the protein is supplied by the flour and cake is apt to have less flour than bread If milk and eggs are used in baking cake, the protein content would be increased by the amounts in these ingredients.

The bread and rolls supply more vitamins and iron because under War Food Order No 1 they must be enriched with extra amounts of iron, and three B vitamins, thiamin, riboflavin and niacin Cake and pie may be enriched if the baker wishes to add these ingredients, but they need not be.

The reason for bread enrichment is to supply the vitamins and iron which many persons would not otherwise get from their daily diet People with limited money for food, who are most likely to go short on vitamins and iron, are usually heavy bread eaters They cannot afford much cake or pie so they will not be missing much in vitamins by lack of enrichment of these products

With flour supplies limited, it is important that most of it go into the most nourishing form of baked products and into one on which very many people depend for the mainstay of their daily diet

Science News Letter, May 11, 1946

CHEMISTRY

1080, Deadly to Rats, Found Harmless to Fish

➤ 1080, THE NEW rat-killing chemical so poisonous to rodents that two ten-thousandths of an ounce will kill a full-grown rat, seems to be harmless to fish Two zoologists, Joseph E. King of the U S. Fish and Wildlife Service and Prof William T Penfound of Tulane University, tried out some solutions of 1080 on fingerling bream and bass, and found that the young fish could swim around indefinitely in water containing as much as 370 parts per million "with no apparent discomfort." (*Science*, April 19)

Science News Letter, May 11, 1946

PSYCHOLOGY

Don't Worry If Child Confuses Fact With Fancy

➤ DON'T BE disturbed if you have a child who confuses fact with fantasy

Most children do, Martha Wolfenstein of Hunter College told the Eastern Psychological Association meeting at Fordham University in New York

The psychologist reported that mothers who read stories to their children rarely see any relation between the children's story and real life. But children often relate such stories to the immediate problems in their lives And the more imaginative the mother, the more productive of fantasy will be the child's mind

When a mother reads a story to a child, her reactions are sometimes very different from that of the child by her side whose realistic reception of the story might be amazing to the parent.

Science News Letter, May 11, 1946

ASTRONOMY

Emissions of Sun Cause Magnetic Disturbances

➤ OCCURRENCE of magnetic disturbances on the earth seem to be correlated with the solar corona and the existence on the sun of regions of intense coronal emission A two-year study of coronal and magnetic data shows that, on the average, magnetic disturbances occurred when intense emission-regions of the solar corona were situated in the eastern hemisphere of the visible solar disk

A report on this study was given at the joint meeting of the International Scientific Radio Union and the American Institute of Radio Engineers by A H Shapley of the Carnegie Institution of Washington and W. O Roberts of the Harvard College Observatory, Climax, Colo The observations were made at the Colorado site One purpose of the study and report is to show the practical advantages and limitations of the correlation when applied to forecasting short-term disturbances.

"The basic objective of the solar-terrestrial correlation," Mr Shapley stated, "is to improve techniques of short-term forecasts of the behavior of ionospheric layers for use in radio communications and allied problems For the successful attainment of this objective the coronal data have definite usefulness."

"There is, however, still considerable uncertainty in the coronal data and in the use that it is so far possible to make of them," Mr Shapley continued "It is hoped that further analysis will result in better methods of forecasting through improved knowledge. A study of the effect of latitude-distribution on the nature of the correlation is perhaps the most important of these, inasmuch as the active solar regions encountered during the test period were predominantly in low latitude, belonging to the waning cycle, whereas regions of the new cycle, in high latitude have since become more numerous"

"Probably we can never obtain completely trustworthy forecasts from coronal observations," he stated. "But, since we have derived a correlation that seems to have a higher significance than those derived from other solar phenomena, and since there is some reason to expect that physical conditions of the solar corona can influence those of the ionosphere, the authors believe that investigation of the coronal-magnetic relationship merits further intensive study"

Science News Letter, May 11, 1946

CHEMISTRY

Our Perfumed World

Wide use of perfume made possible by inexpensive synthetic odors; fragrance of a few flowers never captured in nature has been duplicated.

By MARTHA MORROW

See Front Cover

➤ WE LIVE in a perfumed world All soap, even the cheapest type of laundry soap, is perfumed to kill the fatty odor of the soap itself Hair tonic, tooth paste, bath powder and baby oil are scented Shaving cream and vanishing cream incorporate a not-too-powerful fragrance Perfume may compose as much as 2% of a girl's lipstick, not only to impart a pleasant fragrance, but to cover up the odor of one of the chief ingredients of lipstick, castor oil

The fresh smell of the out-of-doors is brought into an air-conditioned building through perfume

The typical odor that warns of escaping gas is man-made The obnoxious odor that is characteristic of toxic gas was created by the perfume industry so that a man's nose would tell him of the presence of the colorless, tasteless gas before he was overcome by it

Unpleasant odors in fabrics are covered up by perfume The smell of synthetic rubber must be changed if a rubber toy is to find favor with its young owner Medicine is made more palatable by giving it a pleasant flavor, which in the last analysis means a pleasant scent

Synthetics Indispensable

There are few industries today that do not use the raw materials of perfume or materials that have been perfumed But perfume could not meet such a widespread demand were it not for the new fragrant materials made possible by modern science Synthetics are indispensable to every perfume manufacturer

It takes 33,000 pounds of violet leaves (with 2,000 flowers for each pound of leaves) to yield a pound of the natural oil that imparts the odor. Natural oil of violet leaf remains a treasured material for fine perfumery, but modern chemistry has produced several substances having a violet-type odor

A ton of roses is needed to obtain ten ounces of the fragrance-imparting oil Today a somewhat similar odor can be produced in the laboratory The modern perfumer will tell you that both are equally important to him, the attar of rose and the synthetic

No satisfactory way has ever been found of extracting the natural oil from lilacs, like those in the staff photograph on the cover of this SCIENCE NEWS LETTER, thus that illusive scent can not be gotten from nature But synthetic lilac, an exquisite reproduction of this favorite scent, today is available to everyone Similarly, though a natural lily-of-the-valley oil has been extracted, the perfume having that odor is commercially available only through the use of synthetics

What are the synthetics that go to make up this violet, lilac, rose or lily-of-the-valley? Each odor does not consist of a single chemical, but rather of a group mixed together in careful proportions. The single chemicals in the group may or may not have the odor of the flower, but the group as a blend can capture it beautifully.

For violet, for instance, there is ionone, one of the first perfume synthetics ever made Ionone is made from a chemical called citral which is found in Indian lemongrass oil For the lilac odor, one of the most common ingredients is terpineol, made from materials found in the Southern pine tree

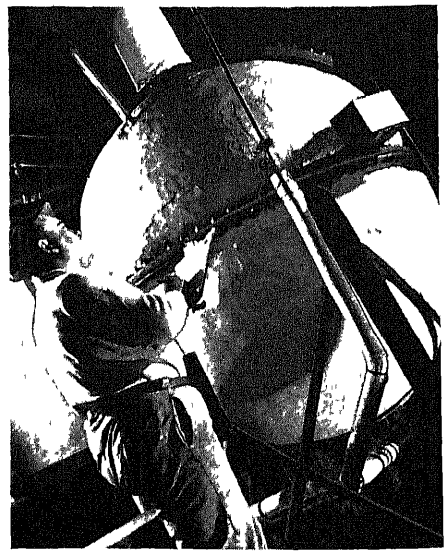
For the rose odor, the perfumer chooses phenyl ethyl alcohol, which, though found in the rose, is made synthetically from coaltar derivatives For the lily-of-the-valley, one of the most precious odors is hydroxycitronellal, itself not known in nature, but made from materials found in the well-known mosquito repellent, oil of citronella These are but a few of several hundred synthetics which the perfumer is constantly using

Every time you smell a gardenia, you are smelling not the flower, but the oil contained in it It is this oil, that you have probably never seen or felt, which must be extracted The oil that gives fragrance to a shrub or tree is sometimes found in the petals, sometimes in the seeds, and often hidden in the bark The natural oil contained in the petals of a flower is the most precious Otris, resembling violet in fragrance, comes from a root Oil is gotten from the peel of the fruit of an orange tree Cinnamon oil comes from the leaf and the bark

A few communities throughout the world are outstanding centers for these essential oils In these localities certain flowers, grown in profusion, are most fragrant, for the odor varies under different climatic conditions just as fruit from some areas is more tasty than from others

The town of Grasse, in southern France, is renowned among perfumers for its jasmin, tuberose, jonquil, rose, carnation and less delicate but nonetheless popular oil of lavender. A little isle off the coast of Madagascar, called Reunion, supplies the world with such important oils as geranium, ylang ylang and vetivert

A few essential oils are produced in America. Oil of peppermint comes from Michigan Pine oil is produced in conjunction with our Southern turpentine



MAKING PERFUME—One of a battery of vacuum stills that isolates from a crude chemical substance, such as coal tar, the usable perfume component is shown at the du Pont plant, New Brunswick, N. J. The fragrance being created here is aubepine, a characteristic odor of hawthorn.

industry Oil of spearmint, some natural wintergreen, the ancient cedarwood and rank wormwood are also secured in the United States Citrus oils are extracted from our lemons and oranges. But the natural oils produced in this country, though important, do not include any of the gems of the perfume industry

Natural oils may be extracted in several ways Steam distillation, the cheapest of the methods, is used in extracting a wide variety of oils that come from all parts of plants that are grown in many parts of the world It is used for sandalwood that comes from a tree, vetivert, that comes from roots, and patchouli, that comes from leaves

The roots, leaves or twigs are boiled in water Steam blown through the mixture carriers the vaporized oil to a condenser where the water and oil are condensed as liquids Because the oil is not miscible with water, it can easily be removed But many of the most delicate and expensive flowers cannot be treated in this way, as heat and water change their character and destroy their value

A process that has changed little in the past few centuries is that of enfleurage Flowers brought fresh to the factory are placed by hand, a few hours after being picked, on glass trays coated with fat, primarily lard The petals are allowed to remain in contact with the fat for about a day, during which time the odorous constituent is absorbed from the flowers The fat is then washed with alcohol or benzene to separate the perfume from it This hand process still is used extensively in France to recover the perfume from jasmin and tuberose

One of the oldest processes for the extraction of oil is maceration It consists of immersing the flower in warm fats or oils For this purpose, the ancients used olive oil and other vegetable oils, but today, where this process is used at all, animal fats are employed

A volatile solvent such as petroleum ether or benzene is used to extract the natural oils from such flowers as orange blossoms and mimosa and is also used for the jasmin By a series of processes the natural oil is transferred from the flower to the solvent, which is then evaporated, leaving the perfume oil

Such odors as oil of lemon and other citrus products are extracted simply by pressing on the peel, a process known to the industry as expression

A thorough description of these processes and of other aspects of perfume and odor is found in Edward Sagarin's recent book, "The Science and Art of Perfumery"

Three types of ingredients are used in the making of perfumes Odoriferous components such as natural oils and synthetics supply the main part of the perfume odor, and impart the pleasing fragrance A large variety is usually employed, perhaps a score or two in a single perfume Then there is the diluting agent, a specially prepared alcohol This may either be produced by fermenting molasses or grain, or it may be created synthetically The fixative blends the many odors into one and gives the perfume its lasting quality Good perfume will keep its same fragrance for many hours on the handkerchief or hair, and for many years in a well-sealed bottle

Until recently the fixatives were exclusively of animal origin and so great was the demand for musk that the male musk deer of Tibet, from whose glands the natural musk grains are extracted, was in danger of being exterminated A means was recently found, however, of using the tiny glands of muskrats trapped in Louisiana's bayous as a fixative. This new natural musk, made possible through discovery of a way to oxidize the almost odorless musk alcohols and convert them to the extremely odorous musk ketones, has proven an excellent fixative.

A number of musk substitutes has been developed, but while somewhat similar to natural musk in their odor effect, they cannot be said to have the power, strength or depth of natural musk

A sweet odor alone is not pleasing To obtain the most liked fragrance, combinations must be chosen from the four types of odors—sweet, acid, burnt, and the unpleasant group known as goat odors Some of the most valued substances for perfumes, such as civet obtained from the civet cat of Ethiopia, are extremely evil-smelling These materials have been of special importance lately because most of the perfumes popular today contain one or several unpleasant odors, used in small proportions where it becomes a part of a pleasant bouquet

Perfume experts are continually mixing essential oils and synthetics in minute quantities to create new perfumes that will be subtle and lasting in their fragrance But the final test for a good perfume lies with the olfactory senses No machine has yet been invented that can analyze smell—the human nose is still the superior perfume sniffer

Science News Letter, May 11, 1946

ASTRONOMY

Sailors Report Seeing Sky Fireworks

➤ THE OLD SAYING that all a sailor sees is the sea is refuted by reports of celestial fireworks received by the U S Navy Hydrographic Office

Sailors have seen a red and yellow meteor flashing through the skies over the Atlantic and another greenish-white fireball with a small tail A ship's officer in the Caribbean reported a bright greenish-blue meteor.

Even seeing the sea can have its interesting side, too, for a ship in the Pacific off Panama reported sailing through large patches of maroon-colored water

Science News Letter, May 11, 1946

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Do You Know?

Peach trees need ground limestone plus a complete fertilizer

Half the total income from *poultry* in America comes from the sale of eggs

Victory gardens are needed again this year because of the world shortage of food

Mohammedans consider the *praying mantis* holy, and it a sacrilege to kill one of these insects

Sterilization of *pruning tools* used by tree surgeons is sometimes necessary; it is now known that canker stain, a deadly fungus disease of the plane tree, is carried on contaminated tools

A process of making *Prussian blue,* an important pigment in commerce, has been developed in India using ferrous sulfate and potassium ferro-cyanide to obtain ferrous ferrocyanide which is then oxidized by potassium chlorate

The best method of determining the correct harvest time for *peppermint* is by a laboratory analysis of the oil for its free menthol content, as this may decrease by 30% if the crop is cut too soon or too late



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PHYSIOLOGY

New Circulation "Map"

Tracers used to study the permeability of gases in living cells of the human body. Blood circulation mapped in experiments with intact human subjects.

A "MAP" of blood circulation and a new theory of the permeability of gases in living cells of the human body have resulted from wartime research by the Aero Medical Unit of the University of California

The circulation of the blood was mapped in experiments with intact human subjects. Radioactive argon, xenon and krypton, produced in the atom-smashing cyclotron, were used to trace the flow of blood in all tissues of the body

The experiments verify some theories which have been formulated by scientists but have been largely unproved because, since the time of the ancient Greek, Aristotle, researchers have had no way of studying the circulation without seriously damaging experimental human subjects

The circulation "map" indicates that there is a large central pool of blood, consisting of about 70% of the body's supply, which circulates rapidly between the heart, kidney, liver, thyroid, lungs and brain. Lying outside this pool, in the extremities and other body parts, is the remaining 30%, which streams in and out of the central pool at a sluggish rate.

Within 15 seconds after it is taken into the body, material becomes well mixed with the fast-moving central pool, but it takes as much as 15 minutes for such material to reach the outlying pool

Subjects were allowed to breathe radioactive argon, xenon and krypton—all inert, rare gases—through a metabolator Geiger counters placed over various organs, such as the head, abdomen, legs, hands, arms, fatty areas, and the vital organs, gave a picture of the distribution, rate of accumulation and speed of circulation in all these parts of the body. Circulation in the skin was measured by placing a Geiger counter over the skin between the thumb and index finger. Brain circulation was measured by placing Geiger counters on the head, since the circulation of gas in the bone and other parts of the head is very slow—almost negligible in the early stages—the recordings on head circulation were a measure of brain circulation.

The scientists also determined that the membrane of body cells apparently offers no barrier to the exchange of gas between cells and the blood The rate of exchange of gas between cells and the blood depends on the amount of gases the blood brings into contact with the cells, in other words, the efficiency of the circulation system determines the amount of exchange of gases

Permeability of the cells was determined by measuring the excretion by the whole body of radioactive gases and nitrogen

In the metabolism of the body gas exchange in cells is of extreme importance The cells breathe oxygen, nitrogen and other gases just as the body as a whole does When the circulatory system is unable to carry sufficient gases to the cells of the various parts of the body the cells and the whole body suffer

The importance of gas exchange in

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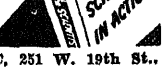
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aviation medicine prompted the studies High-altitude sickness, or bends, occurs among persons with poor circulation, while those with efficient systems are relatively resistant because sufficient oxygen is carried to the body cells to rid them of the nitrogen which causes the disease

The research was performed largely by Dr Hardin Jones, instructor in medical physics Dr John H Lawrence, director of the Aero Medical Unit, supervised the work, which was sponsored by the Office of Scientific Research and Development

Science News Letter, May 11, 1946

GENERAL SCIENCE-EDUCATION

25 High School Seniors Honored in Tennessee

➤ TWENTY-FIVE of Tennessee's high school students have been picked in the first Tennessee state-wide Science Talent Search as the most promising "scientists of tomorrow", Dr Hanor A Webb, president of the Tennessee Academy of Science, has announced

The five girls and 20 boys who are winners are eligible for scholarships in Tennessee colleges and universities

The Tennessee search was run concurrently with the Fifth Annual Science Talent Search for the Westinghouse Science Scholarships, as a cooperative effort with Science Clubs of America, administered by Science Service, Washington, D C

"The members of the Tennessee Academy of Science are firmly convinced that youth with an aptitude for science is one of the country's great national resources," Dr Webb said "This statewide Science Talent Search will make it possible for certain Tennessee young scientists to continue their careers in science and will help to remedy the nation's grave deficit of scientists"

Science News Letter, May 11, 1946

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CHEMISTRY

Wartime Smoke-Pots Used to Protect Apples

➤ SMOKE-POTS, that formed a protective screen for troops during the war, were used to protect Vermont's apple crop

Six hundred of the 30-pound smoke-pots were rushed to Bennington County, Vt, to combat below-freezing temperatures that menaced the McIntosh apple orchards

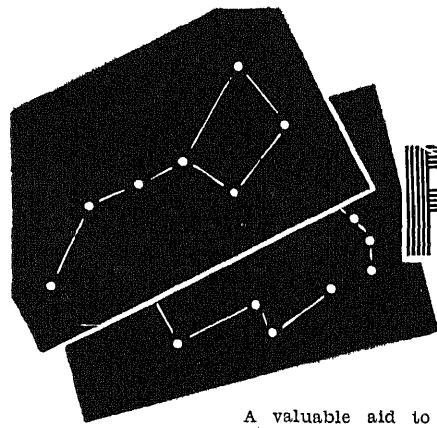
The smoke-pots, burning hexachlorethane, produce a white, non-gritty, sootless and harmless smoke Each pot smokes for about 10 minutes The heat will not raise the temperature appreciably, but it does raise the dew-point enough to prevent frost

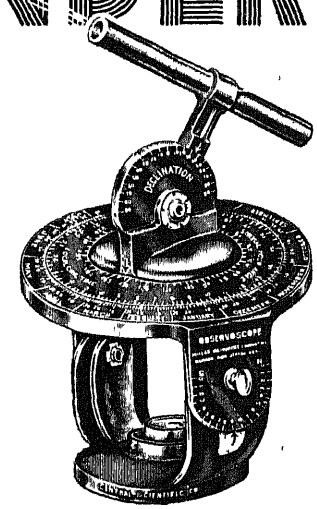
"Operation Smoke-Pot" is being handled by the federal and state agricultural authorities in cooperation with the county agricultural agent of the University of Vermont Extension Service

Chemical Warfare Service has 52,000 smoke-pots of the 30-pound size and countless others of varying sizes They were offered to the Surplus Property Division, but the latter agency said the smoke-pots were useless and should be junked

Science News Letter, May 11, 1946

STAR FINDER





A valuable aid to the student of astronomy or of navigation has been designed to locate celestial bodies quickly and accurately The Millar Observoscope is made on the same principle as the equatorial mounting of the astronomer's telescope This precision instrument is constructed of impact-resistant phenolic plastics with declination and latitude scales impressed in the body of the instrument Impressed also are scales which indicate month, clock and sidereal hour angles

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The instrument may be mounted on a camera or astronomical tripod or simply placed on its weighted base for accurate observations It may be used equally well to locate true north, to indicate civil time or latitude if all known settings are made and the sight tube is pointed to a known star It is designed for use north of the equator For use south of the equator, a special instrument can be supplied

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AN ENEMY OF THE PEOPLE Antisemitism—James Parkes—*Penguin*—151 p, paper, 25 cents A study of the historical, sociological and psychological aspects of antisemitism

HANDBOOK OF INFECTIOUS DISEASES With Notes on Prophylaxis, Serum Treatment and Vaccination—Staff of the Cantacuzene Institute—*League of Nations,* 331 p, tables and illus, paper, $1 25 Facts relating to infectious diseases, their diagnosis, treatment and prevention, gathered in the light of experience gained during both World Wars and the intervening period

LUTHER BURBANK A Victim of Hero Worship—Walter L Howard—*Chronica Botanica,* 333 p, illus, paper, $3 75 An analysis of the life and work of the late well-known American plant breeder Volume 9, No 5/6 (pp 299-522) of Chronica Botanica

MATHEMATICIAN'S DELIGHT—W W Sawyer—*Penguin,* 215 p, diagrs, paper, 25 cents The author attempts to show what mathematics is all about, how mathematicians think, when mathematics can be of some use A book based on the theory that mathematical reasoning can grow gradually and naturally through practical work with real objects

THE NATIVE CULTURE OF THE MARIANAS ISLANDS—Laura T Thompson—*Bernice P Bishop Museum,* 48 p, illus, paper, $1 Bernice P Bishop Museum Bulletin 185

THE PAPER INDUSTRY—Josephine Perry—*Longmans,* 128 p, illus, $2 The story of the processes of manufacturing paper from the tree farms to the chipping machines and the chemical changes necessary to make the finished paper product

PATH OF FLIGHT Practical Information about Navigation of Private Aircraft—George Sidney Stanton — *Government Printing Office,* 32 p, charts and tables, paper, 40 cents A discussion of navigation limited to the needs of the private pilot without instrument rating

PEACE AGENCIES—Carleton Mabee—*Occupational Index, Inc,* 25 cents Information about employment in peace agencies Occupational Abstract No 92

THE PETROLEUM INDUSTRY—Josephine Perry—*Longmans,* 128 p, illus, $2 The early struggles of the crude oil business which had its beginnings in Pennsylvania in 1859, the tremendous advances which have been made in obtaining, processing, and transporting petroleum, and the by-products and future developments of the petroleum industry

PHOTOENGRAVING—Ruth Selina—*Occupational Index, Inc,* 25 cents Information about employment in the photoengraving trades Occupational Abstracts No 91

PHYSICAL CHEMISTRY FOR PREMEDICAL STUDENTS—John Page Amsden—*International Chemical Press,* 298 p, diagrs. and tables, $3 50 A textbook written especially for a one-semester course for premedical students, including only those portions of elementary physical chemistry which will be of value to the medical student in his later professional work

PLANTS OF THE MANU ISLANDS—T G Yuncker—*Bernice P Bishop Museum,* 73 p, map, paper, $1 Bernice P Bishop Museum, Bulletin 184

THE POPULAR MEDICAL ENCYCLOPEDIA—Morris Fishbein, M D—*Doubleday,* 540 p, illus, $4 95 Written for the layman, it tells about the human body—its functions, its disturbances, and latest methods of prevention of its disorders

REALM OF FLIGHT Presenting Practical Information About Weather in Relation to the Piloting of Private Aircraft—George Sidney Stanton—*Government Printing Office,* 41 p, tables and illus, paper, 60 cents A brief text designed to help the pilot by giving him a general background of weather knowledge together with basic facts about sources of weather information, interpretation of weather maps, how to avoid dangerous conditions, etc

RECREATION—Helen R Blank—*Occupational Index, Inc,* 25 cents Information about employment in recreation leadership Occupational Abstract N 90

SEX AND THE SOCIAL ORDER—Georgene H Seward—*McGraw,* 301 p, tables and illus, $3 50 A phylogenetic approach to problems of sex in the life of the group.

SONGS OF UVEA AND FUTUNA—E G Burrows—*Bernice P Bishop Museum,* 121 p, paper, $2 50 Bernice P Bishop Museum Bulletin 183

SOUTH AMERICAN ZOO—Victor W Von Hagen—*Messner,* 182 p, illus, $2 50 Informative and lively descriptions of the appearance, habits and personalities of the unfamiliar creatures that make up the animal life of South America, illustrated by Francis Lee Jaques A book for young people in the later grades or high school

UNFINISHED BUSINESS IN AMERICAN EDUCATION An Inventory of Public School Expenditures in the United States—John K Norton and Eugene S Lawler—*National Education Assn. and American Council on Education,* 64 p, tables and illus, paper, $1

THE WEATHER FOR A HOBBY—Raymond Yates—*Dodd,* 172 p, diagrs and illus., $2 75 How to predict the weather and make the instruments needed to study it

WHAT YOU CAN DO FOR ANGINA PECTORIS AND CORONARY OCCLUSION—Peter J Steincrohn, M D—*Doubleday,* 254 p, $2 50 A book for the layman which answers practical questions and gives practical advice to all sufferers from coronary trouble

Science News Letter, May 11, 1946

Alumina, source of aluminum metal, can be made from potassium alum by a method developed by the U S Bureau of Mines in its program to make America independent of foreign minerals as far as possible.

Nematode worms in the soil like watermelon roots about as much as people do the melon; if the nematodes sap the roots, the melons do not grow, but a little chloropicrin in the soil, spotted where the seeds are to be planted, kills the worms

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BOTANY

NATURE RAMBLINGS

by Frank Thone



Treacherous Triad

➤ POISON IVY season is with us again. Just when it gets to be really nice weather for picnicking, and the kids look forward to hikes in the country and perhaps a summer camp, once school is out, this three-leaved enemy of the human epidermis reaches its fullest, most malignant development. Only the drier parts of the country, from the High Plains to the crest of the Sierra and Cascades, are free from this ill weed and its almost identical twin, the West Coast poison oak.

What to do about poison ivy? If you know you are sensitive to it, the very best remedy is not to have anything to do with it. The plant is easy to identify, a vine climbing tree trunks, stone walls and the like with myriads of aerial roots, or a gray-barked, sparsely-branched shrub, with glossy, three-parted leaves. The old warning jingle, "Leaflets three, let it be," is perfectly good field botany so far as poison ivy and poison oak are concerned.

Margins of the leaflets may be deeply lobed, shallowly notched, or altogether smooth. Poison ivy is an exceedingly variable species, and you can often find considerable differences among the leaves on the same plant. The effort, sometimes made on the basis of leaf shape, to set apart an Eastern "poison oak" from poison ivy is futile; there are just too many transition shapes among the leaves.

Poison-ivy flowers are loose clusters of tiny, greenish-white bloom, the berries change from green to pallid gray-white in autumn. Curiously enough, some birds seem to be able to eat them with impunity.

If you *must* go where there is poison ivy, a preventive treatment that protects most persons can be made by dissolving about a teaspoonful of ferrous sulfate (copperas) in a pint of half-and-half mixture of alcohol and water, and adding a little glycerin. Spread this on exposed portions of the skin and let it dry without wiping. Curative properties are also claimed for this mixture, but prevention is always better than cure.

About two persons in three are sufficiently sensitive to poison ivy to suffer after effects from contact with it. The lucky remaining third either develop few and inconsequential blisters, or even handle the pesky weed with as much impunity as if it were so much grass or spinach. Such fortunates should, however, remember two things: (1) it is always possible to lose that immunity, without notice, (2) if they do heroically pull up a patch they should immediately rinse their hands in rubbing alcohol or wash them with strong soap, for subsequent contacts with non-immune persons can transfer the poison to them.

Science News Letter, May 11, 1946

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Science News Letter, May 11, 1946

⚙ *REPEATING flash bulb for photographers can be used for several thousand individual flashes of daylight brilliancy Its bulb is similar to the three-pronged projection lamp Inside is a gas-filled coil tubing running between two electrodes Condenser discharges through the coil produce the flash*

Science News Letter, May 11, 1946

⚙ *DIE CASTING, the economical short-cut between raw metal and finished parts, can now be carried out in any machine shop with a new machine costing no more than a small engine lathe Completely fabricated die sets permit the manufacturer to make his own dies*

Science News Letter, May 11, 1946

⚙ *CLEAN-KEEPER for typewriter-types is a special rubber pad on a handle that is used dry to brush over the type each day The springy pad is behind a sheet of so-called blotting rubber which is well covered with tiny projections that remove the debris No fluids are used with it*

Science News Letter, May 11, 1946

⚙ *TELEVISION receiver for the home, made to sell for around $150, is shown in the picture Housed in a cabinet 21 inches long, it employs a seven inch picture tube and provides a picture large enough for easy viewing by a group of people in an ordinary size room.*



Science News Letter, May 11, 1946

⚙ *FLOOR CLEANER and waxer is a perforated aluminum tray, about the size of a carpet sweeper, attached to an ordinary mop handle A steel wool pad is clamped over it for cleaning, this is replaced with a waxing cloth when desired, liquid wax being poured into the tray*

Science News Letter, May 11, 1946

⚙ *GIANT testing machine, which compresses, stretches and twists steel and other structural materials with tremendous power, can subject a steel beam or joint to 1,000,000 repetitions of stress in four days, or more than it would normally be subjected to in 50 years as part of a bridge.*

Science News Letter, May 11, 1946

⚙ *DIAL INDICATOR gauge for extremely small holes, the first of the type for drillings of such minute diameter, measures holes as small as 122 inch in diameter and up to about twice that size With it, internal defects are recorded immediately on the dial and dimensional variations shown.*

Science News Letter, May 11, 1946

If you want more information on the new things described here, send a three cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 310.

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Question Box

BOTANY

What is the best treatment for poison ivy? p 303

CHEMISTRY

How many pounds of violet leaves would it take to get a pound of the natural oil? p. 298

How were smoke-pots used to protect apples? p 301

What effect does 1080 have on fish? p. 297

GENETICS

How are cancer and hair color linked in mice? p 296

MEDICINE

What diseases will be treated with the still-scarce streptomycin? p 293

What type of penicillin may fail when swallowed? p 297.

PHYSICS

What is the synchrotron? p 291

PHYSIOLOGY

What has been learned about blood circulation from the new "maps"? p 300

Where published sources are used they are cited

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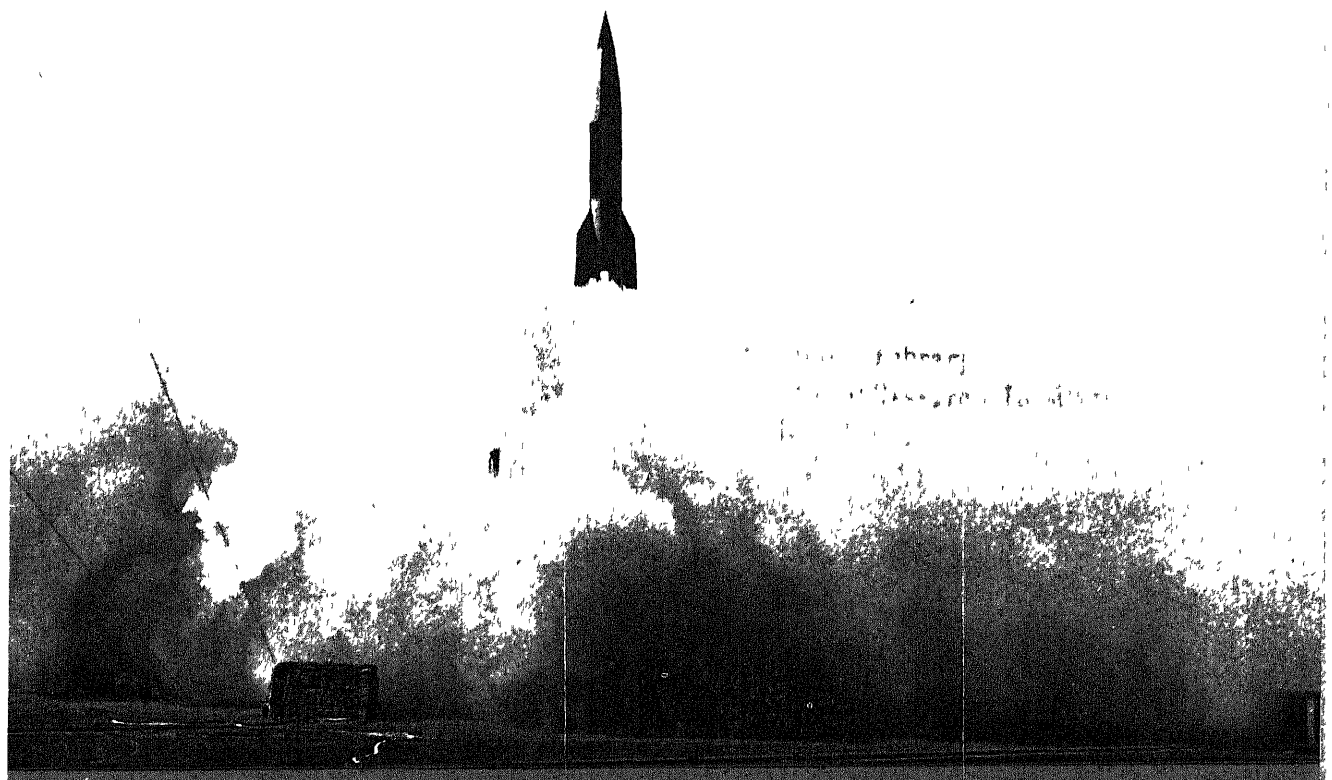
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IENCE NEWS LETTER

Vol. 49, No. 20

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MAY 18, 1946

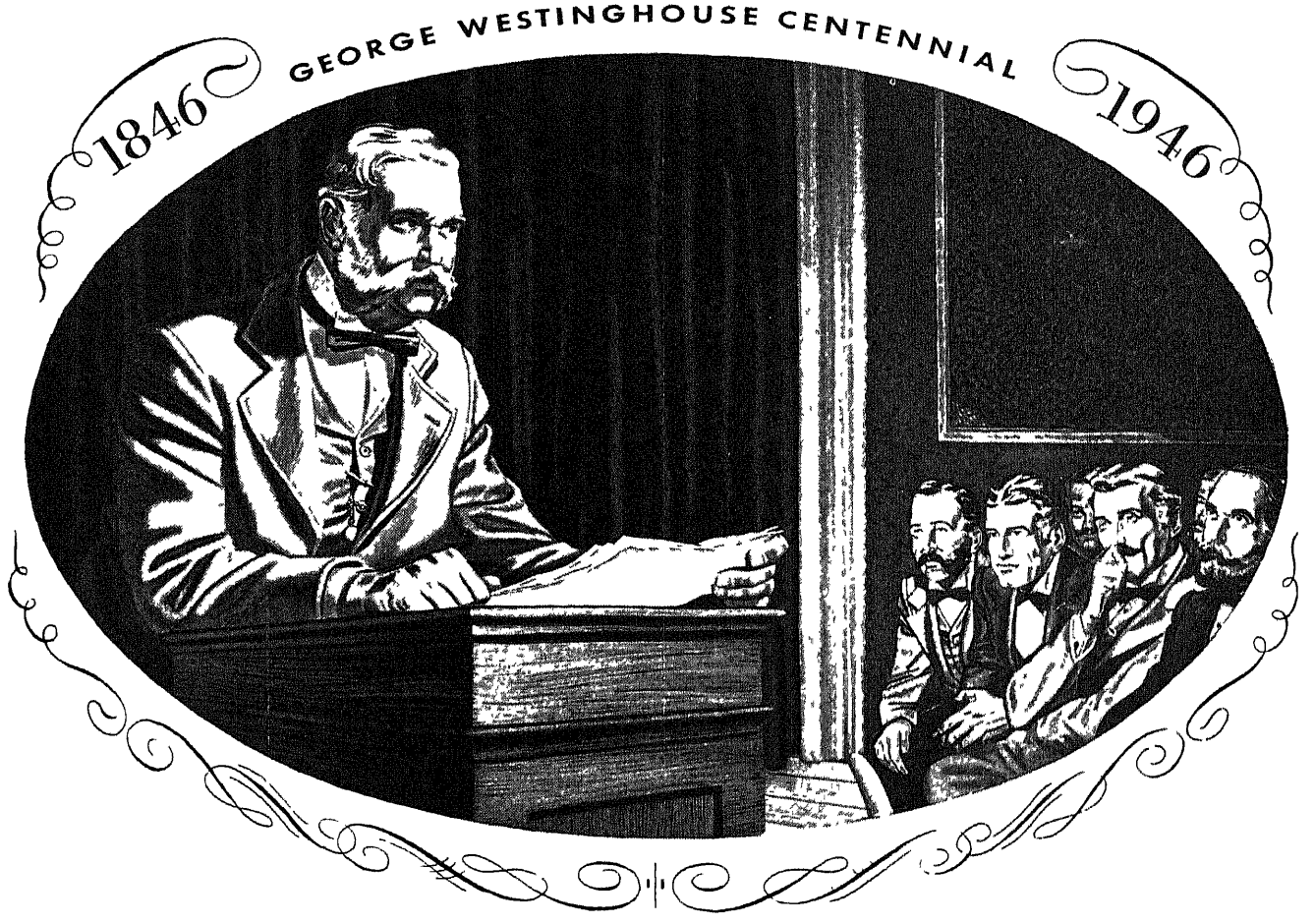


Mighty Missile

See Page 307

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946



Prophet, *with* honor...

"Had a Jules Verne sought to imagine some universal servant of mankind, he would well have depicted some *magic agent* which would apply Nature's forces to do man's work which could take the energy out of hidden coal and falling water, carry it by easy channels and cause it to give the light of a million candles, the power of a thousand men — or to produce heat without combustion, and unlock chemical bonds and release new materials "

These are words of George Westinghouse, prophetic words because he uttered them many years ago on the subject of *electricity* — and then, as inventor and forward-looking industrial leader, did much to make them come true

Scientific societies, kings, and governments throughout the world honored George Westinghouse with their proudest medals and decorations

But he himself built his own lasting monument to greatness — the giant industries he created They serve today because they were founded by a man who looked ahead into the *future of human needs*, then found the practical means to satisfy them



George Westinghouse Centennial Forum

As a fitting tribute to the memory of George Westinghouse, a meeting of distinguished scientists and engineers will be held in Pittsburgh, from May 16th to May 18th

At this George Westinghouse Centennial Forum, world-famous authorities will discuss such subjects as "The Future of Atomic Energy" "Transportation — A Measurement of Civilization" "Horizons in Communications" and "Science and Civilization"

As sponsor, the Westinghouse Educational Foundation sincerely hopes that the Forum will accomplish much good in showing the way to a *better, happier, safer peacetime world.*

Westinghouse

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ORDNANCE

V-2 Rocket Test

Radar tracks the flight of the gigantic weapon on its mission into the stratosphere during experiments at White Sands Proving Grounds, New Mexico.

By WATSON DAVIS

See Front Cover

➤ TO SEE a gigantic rocket go flaming into the stratosphere, farther than man has has ever before hurled his might, makes one resolved that there should never again be a war such as the Germans waged upon London with sisters of the V-2 we saw launched upon the shining deserts at White Sands, New Mexico The official U S Army photograph on the front cover of this SCIENCE NEWS LETTER was made approximately 100 yards from the rocket as it rose from the launching platform

Suppose instead of peaceful scientific instruments there had been an atomic bomb in that rocket's nose

The target of that V-2, and the two dozen to follow at weekly intervals, is the peaceful, almost airless stratosphere above us. The aim is to discover more about rocket flight than the Nazis in their destructive hurry had time to find out

Jules Verne, and even the late Robert H Goddard, rocket pioneer though he was, would have marvelled

Radar tracked the swift flight just as our counter-rocket defenders hope they can spot one coming at us. A telescope any astronomer would be proud to own, 16-inch in size, watched the meteorite flung upward from the earth

Two-thirds the way up to its world record altitude of 75 miles, the rocket yawed and twisted like a tin can in flight because the guiding fins had no air to work on

Of most interest to the Army's ballistics experts was the path followed, the trajectory They will compare the actual flight with the computed paths These studies are the stuff that rocket progress is made from

Almost too brief is the visit of the V-2 to the stratosphere if it is to make useful observations on cosmic rays Or even the sun's spectrum unimpeded by the ozone layer that protects us from intense sun radiation here on the surface Rocket experts are already wondering whether for scientific purposes they can add a small boosting jet to the V-2 monster that would keep it at peak height a short time while instruments recorded precious information

Closest approach of the record height reached in the firing of the V-2 was the approximate 50 miles reached by V-2 rockets traveling from the continent to London during the war The previous U S record was 43 miles made by the American-made rocket "Wac Corporal" in tests at White Sands last October The Germans in their experiments do not seem to have tried for ultimate altitude

Science News Letter, May 18, 1946

MEDICINE

New Anti-Malaria Drug To Be Available

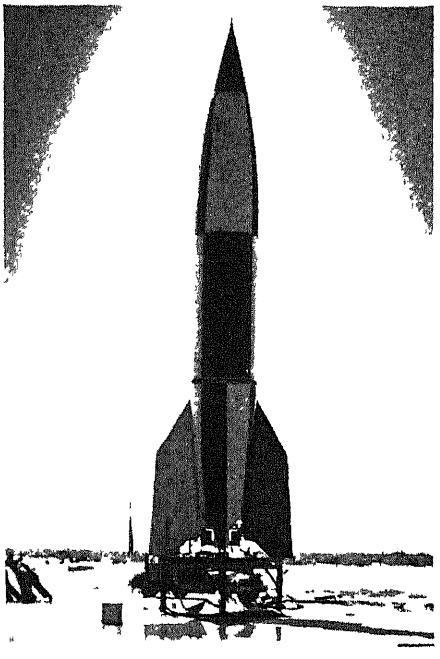
➤ A NEW anti-malaria drug will be in the drugstores of America probably by midsummer The drug has been named aralen It is one of the 14,000 substances tested for antimalarial activity by American scientists during the war At that time it went under the name of SN 7618

Better than atabrine and much better than quinine, was the verdict of scientists who tested the drug for the Board for the Coordination of Malarial Studies

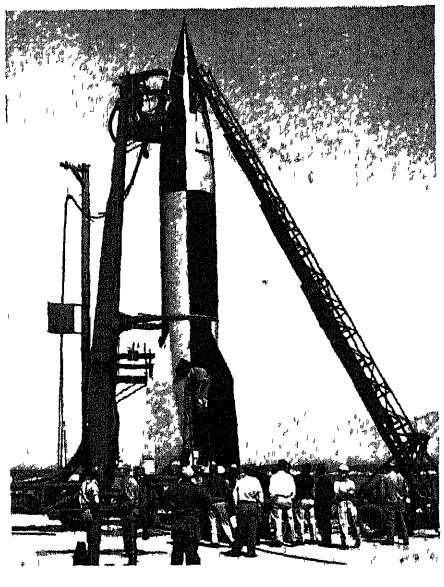
No yellowing of the skin goes with taking the white pills of SN 7618, or aralen It does not cause stomach and gastrointestinal upsets As a suppressive of malaria, it need be taken only once a week, compared to the daily dose needed when atabrine is used for the same purpose As a remedy, the new drug stops an attack of malaria in 24 hours, while atabrine takes four to six days to bring about recovery

Aralen is now being manufactured in commercial batches regularly, Dr J. B Rice of the Winthrop Chemical Co reports His company expects to have the drug available commercially within one or two months The cost will probably be about the same as that of atabrine, Dr Rice states, although no cost data are available yet

Aralen, a member of the 4-aminoquinoline series of chemicals, had been made



DESTRUCTIVE! — Close-up of a V-2 rocket ready for flight tests at New Mexico. When fired, it carried approximately 5 tons of alcohol and liquid oxygen fuel as a part of the total weight of approximately 14 tons. Official U. S. Army photographs.



CONTROL V-2—Final adjustments are made on the delicate instruments used to control the flight of the V-2 prior to the tests at White Sands, New Mexico.

by German chemists at the I G Farben-industrie plant at Elberfield and had been patented This was not known to American scientists at the time they started their search for new antimalarial drugs when the war cut off the supply of quinine from the Dutch East Indies

The Germans, however, discarded the chemical as no good, while American scientists, once they tested it, recognized its value The German method of synthesis, moreover, was too complicated to be practical for commercial production of the chemical This bottle-neck was overcome by Prof Charles C Price and Dr. Royston M Roberts, of the University of Illinois, who developed an original and simple method of synthesis.

Clinical tests of the drug's value were made with the 20 pounds of it which chemists at the University of Illinois worked 24 hours a day, in three shifts, for three weeks to produce This laboratory-made product was enough for 30,000 doses.

Science News Letter, May 18, 1946

ENGINEERING

Better Television Images

Reproduction from negative films with rising shoulder characteristics may produce superior pictures, actual tests have confirmed.

➤ TELEVISION reproduction from negative films may provide superior television images, Emery Meschter of the du Pont Company told the Society of Motion Picture Engineers in New York.

Features of performance in television to be expected from both negatives and prints as image sources, he said, are predicted from average characteristics of elements of the television system He described a dynamic test procedure for the investigation of the over-all reproduction curve involving film and television

Actual tests, he asserted, confirm the theoretical prediction that a negative film with a rising shoulder characteristic may provide superior television images

The system of color television developed by the Columbia Broadcasting System was described at the same meeting by Bernard Erde of that company These color television pictures had their origin in color film and color slides, he stated

He described in particular the film scanning mechanism and associated optical, electrical, and mechanical equipment constituting the color film and slide pickup portion of the system He emphasized the various interdependent functions of constant film drive, optical and electronic film motion compensation, heat and color filtering, and film and color phasing

Calibration of Lens

An absolute and physically sound method for the photometric calibration of lens apertures was described by Allen E Murray of Bausch and Lomb Optical Company. It was developed in the Scientific Bureau of that company.

Essentially, he said, the method consists in comparing the total flux from a depolished opal glass aperture with the flux through a given lens at a definite stop opening when focussed on the opal glass aperture An integrating sphere is used to collect the flux in the two cases and readings are made proportional to the flux with two matched barrier photocells.

Science News Letter, May 18, 1946

MEDICINE

Search for TB Cure Turns To Chemical Cousin of DDT

➤ THE SEARCH for a chemical cure for tuberculosis has turned to a compound that is a sort of cousin of DDT, Dr Albert Burger and Dr Edith Graef, of the University of Virginia, told members of the Virginia Academy of Science meeting at Richmond.

The latest compound they have made is related not only to DDT but to promin, a chemical hailed a few years ago as a possible remedy for tuberculosis Unlike promin, the new compound contains no sulfur.

It stops tuberculosis germs in the test tube, but, as Dr Burger pointed out, a great many other chemicals do that. How effective it may be against the germs in the human body is not yet known Next step, he said, will be to try it on guinea pigs and if it continues to show promise, trials in humans will be considered.

The lead for the present compound came from the Swiss expermimenters who, searching for a better moth-proofing chemical, changed the structure of a sulfone in a way they hoped would make it more effective in penetrating the waxy outer covering of moth cocoons The result was DDT. Since tuberculosis germs, though very different from moths, also have a waxy outer covering, Dr. Burger and Dr. Graef thought it worth trying to make a chemical with something of DDT's wax-penetrating power. So they also started with a sulfone, choosing the one that is the parent chemical of promin

Science News Letter, May 18, 1946

Magnesium alloy its to be used in *lawnmowers*, it is reported, it will make the mechanism lighter but will not decrease the number of cuttings in a season

SCIENCE NEWS LETTER

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MEDICINE-CHEMISTRY

Fast Headache Relief

Comes two minutes after the sodium salt of nicotinic acid is injected. Recommended for migraine, idiopathic and headaches following spinal punctures.

➤ RELIEF of migraine headache within two minutes after injection into the veins of a chemical related to the anti-pellagra vitamin, niacin, is reported by Dr Joseph W Goldzieher and Dr George L Popkin, of New York City Hospital on Welfare Island (*Journal American Medical Association,* May 11)

The chemical they used is the sodium salt of nicotinic acid This acid is the anti-pellagra vitamin which a few years ago was re-christened niacin to overcome popular prejudice against the idea of a vitamin put into bread to enrich it being an acid

The headache that comes after spinal puncture is also relieved by this chemical relative of a vitamin The chemical is also recommended by the New York doctors for severe idiopathic headaches, a kind for which no cause is known.

The average person given this chemical feels hot, restless and uneasy within 30 to 45 seconds after the injection and his skin will be flushed He may also feel itchy or have "pins and needles" These symptoms usually disappear within 20 minutes to half an hour A few patients preferred the headache to this reaction to the treatment, but the majority were so glad for the relief of the headache they did not mind the other symptoms

The flush and other symptoms result from the dilation of small blood vessels produced by the chemical This dilation is believed responsible for the relief of the headache

Science News Letter, May 18, 1946

PHYSICS

Gas Cans for Atom Test

The force of atomic explosions will be measured with instruments ranging from this simple pressure gauge to the most complicated ever developed.

➤ SCIENTISTS will measure the force of atomic explosion with instruments ranging from gas cans to some of the most complicated gauges ever developed, when an A-bomb drops on the Navy ships at Bikini atoll this summer

Five-gallon gasoline cans will serve as the simplest type of pressure gauge Dr. Ralph A Sawyer, professor of physics at the University of Michigan and civilian technical director of the Crossroads operation, declares that fairly accurate records of the pressure from the blast can be made by seeing how much the cans have been collapsed

Before the scientists have a chance to inspect the cans, they expect to have even more accurate measures of the pressure Readings from far more complicated instruments of greater accuracy are going to be transmitted from gauges on the target ships to distant observers by frequency modulation radio, Dr. L W Chubb, director of the Westinghouse Research Laboratories, announced

With pressure gauges and measuring instruments hooked to radio transmitters, scientists will safely read the record of the test explosion from mother ships

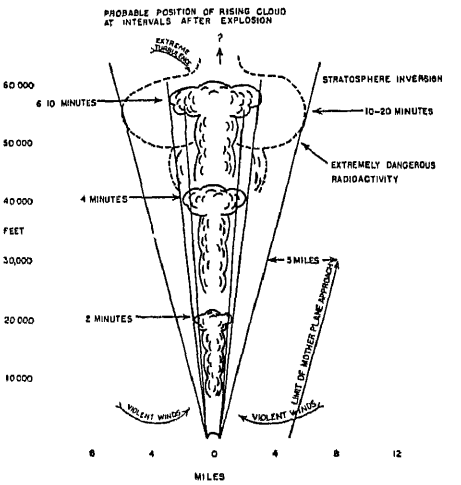
Thirty-six gauges located at 18 positions on two of the target ships will be transmitting readings to observers, with measurements fine enough to record significant changes down to 1/50,000 second, for the water pressure meters Significant changes are expected only every 1/200 second for air pressures.

When the atomic bomb explodes, a brass bellows in each gauge on the ships will stretch a resistance strain gauge The strain gauge frequency modulates a radio transmitter by means of a reactance tube, and the pressure on the gauge is sent to the receiver on a mother ship

For the surface explosion, the second test scheduled at Bikini, cables will be run through the ship's hull into the sea Six tiny tourmaline crystals sealed at the ends of the cables will send electrical impulses over six separate radio transmitters in a target ship.

Water pressure from the blast will squeeze the crystals to produce electrical impulses Tourmaline is used instead of the familiar quartz for the crystals because of greater strength

Science News Letter, May 18, 1946



ATOMIC CLOUD—Object of much study are the atomic clouds which will rise after the bombs are dropped in the Bikini experiments. This sketch of the expected behavior in the first test has been released by Joint Army-Navy Task Force One. Note the region of violent winds at the bottom of the mushroom and the extremely dangerous radioactivity at 50,000 feet. Scientists hope to document their previous studies with much new photographic and instrumental data.

PHYSICS

Cosmic Ray Bomb Discounted by Scientists

➤ ANY IMMEDIATE possibility of a cosmic ray bomb a billion times more powerful than the atomic bomb, as suggested by European cosmic ray scientists, is discounted by American scientists

While it is true that energies giving rise to the cosmic rays somewhere in the depths of the universe are measured in billions of electron volts compared with atomic nuclear energies of millions of electron volts, it would be a very long step from a discovery of the cause of the cosmic rays to making a bomb out of the method of generating them

It may turn out that the conditions under which cosmic rays are generated are impossible of achievement here on earth Astrophysicists feel confident that the Bethe theory of the origin of the

heat of the sun is correct, but they despair of creating the millions of degrees of heat necessary to make it operate The Bethe theory is that atomic energy is obtained in the sun from the light elements, hydrogen being transformed into helium in a complex cycle involving carbon, nitrogen and oxygen, and liberating large amounts of energy

One theory of the origin of cosmic rays is that they are generated when medium weight elements like oxygen and nitrogen are transmuted

The new speculations abroad may justify intensive cosmic ray explorations on potential military grounds alone It is significant that cosmic ray recorders were in the nose of the first V-2 rocket fired experimentally in New Mexico.

Science News Letter, May 18, 1946

NUTRITION

Longer Productive Life

Super-sufficient diet can result in earlier maturity and longer retention of youthful vigor, Franklin Medalist declares.

➤ BECOMING a grownup sooner, the ambition of every youngster, and retaining youthful vigor longer, the wistful wish of every oldster, can both be accomplished by a super-sufficient diet, Prof Henry Clapp Sherman of Columbia University declared in an address before the Franklin Institute after receiving the Institute's coveted award, the Franklin Medal

For some years, Prof. Sherman has been maintaining a race of more-than-well-fed white rats in his laboratories On a high-vitamin, high-calcium, high-protein diet they become mature more quickly and live longer Yet they do not have a long old age. Instead they maintain the full vigor of their prime of life into the period when control animals kept on a merely adequate diet become definitely senile. Comparable results, Prof. Sherman feels sure, could be achieved with human beings, bringing on the vigor of adulthood earlier and making it last into the years that are too often wasted in the ills and ails of old age.

The speaker said, in part:

"A certain food mixture called Diet A was found adequate to the support of normal nutrition generation; yet Diet B, differing only in its proportion of protective food has been found to result in better life histories Growth and development are beneficially expedited, but not forced, vitality is higher and death-rates lower at all ages, full adult capacity or 'prime of life' is attained earlier and retained longer, and the life-expectation is increased not only for the young but also for the adults.

"The previous general progress of public health had increased the life-expectation of the infant but not the adult Now, the nutritional improvement of the norm raises the life-expectation of the adult as well.

"The extra years thus offered are not to be pictured as added to o'd age Rather it appears that something like an extra decade can be inserted at the prime or apex of the life lived in accordance with today's newer knowledge of nutrition Life becomes longer because it is lived on a higher health level throughout The apex of attainment is higher, the period of the prime is longer, and in human terms there is a smaller percentage of years of dependence, in the improved life history to which nutritional knowledge now guides us"

Possible social benefits of thus improving the human race through an abundance of the right foods are obvious, Prof Sherman pointed out On the one hand, there would be a great deal more clear thinking and decisive action, since men and women in later middle life would not be weakening, growing overcautious and becoming obstructive just when they have reached positions of greatest influence and power On the other, the shortening of the years of childhood and of helpless old age would relieve the productive world of its greatest load of dependency

At the same meeting, a second Franklin Medal was awarded to Sir Henry Thomas Tizard of Magdalen College, Oxford, eminent research worker in aeronautics Since he was unable to come to this country to receive his medal in person, he was represented by the Hon Roger M Makins, Minister in Charge of Economic Affairs at the British Embassy in Washington, who read an address prepared by Sir Henry, on Teamwork in Research

Science News Letter, May 18, 1946

CHEMISTRY

1080 Rat Repellent Also Rough on Cats

➤ 1080, war-born rough-on-rats, is also rough on cats Cats find rats that have been poisoned with the deadly stuff, eat them and thereby get a second-hand but still effective dose of 1080 If rat eradicators are using it in your neighborhood, keep Tom or Tabby shut up close until the job is finished, warn scientists in the U. S Fish and Wildlife Service And never, under any circumstances, buy a rat poison that contains 1080, it's just too dangerous for any but professionals to handle

Some such rat poisons have been appearing on the market 1080 is not supposed to be sold indiscriminately for that purpose, but a loophole in existing legislation permits it to leak through, and a few firms seem willing to take a chance on it

1080 will not only kill rats and cats It will kill dogs and even children, if they find a 1080 bait intended for rats and nibble it out of curiosity Trained professionals know how to set such baits so that only rats can get at them, nonprofessionals should let the stuff severely alone.

Science News Letter, May 18, 1946

GENERAL SCIENCE

Wetmore and Valentine Join Board of Trustees

➤ DR ALEXANDER Wetmore, secretary of the Smithsonian Institution, and Dr Willard L Valentine, editor of the Journal *Science,* have been elected trustees of Science Service, the institution for the popularization of science.

Dr Wetmore is a nominee of the National Research Council and succeeds Dr. Charles G Abbot, former secretary of the Smithsonian Institution, who has resigned from the Science Service board after many years of service as vice-president and treasurer

Dr Valentine, a nominee of the American Association for the Advancement of Science, filled the vacancy caused by the death of Dr Henry B Ward, University of Illinois biologist

Dr Harlow Shapley, director of Harvard College Observatory, was reelected president, Dr Alexander Wetmore was elected vice-president, Frank Ford, editor of the Evansville Press, was reelected treasurer and Watson Davis, director of Science Service, was renamed secretary of the corporation.

Science News Letter, May 18, 1946

ENGINEERING

3-Dimensional Pictures

Polarized light control may make them possible for motion-picture theaters and home television screens. Will find increased use in photography.

➤ THREE-DIMENSIONAL pictures in motion-picture theaters and on home television screens are possibilities of the future through polarized light control

Light control through polarization will find increasing use in photography, and uses not dreamed of today will enable photographers to devise new forms of pictorial expression

These are predictions of J A Norling of Loucks and Norling Studios made at the meeting of the Society of Motion Picture Engineers in New York He told how, by the use of a polarizer, reflected glare-light in photography may be eliminated or cut down, and discussed also how modern polarizing screens are made

Light waves are transverse rather than longitudinal vibrations, and when directed against certain crystals and synthetic screens only the vibrations in one plane may pass through The light emitted is said to be polarized Light may be polarized also by reflection

"Polarized light is found in nature on every hand," Mr Norling stated "The sheen on water, pavement reflections, window reflections, some of the light from the sky—these all have polarized light in some degree, and the widest present-day application of polarizers in photography is in the control of light reflected from various surfaces"

Glare-light, he said, "has large components of light polarized along an axis parallel to the surface, and small components at right angles to this. To cut out the glare-light components all that is required is a polarizer whose polarizing axis is turned at right angles to the axis of the glare-light components"

Polarizers can be used to great advantage over the photolamps, as well as in front of the camera lens, he said, particularly in the photography of such things as silverware, glassware and shiny fabrics Polarizers, in the photography of colored objects, eliminate parasite reflections from surrounding objects or surfaces Objects photographed this way, he added, usually have richer, truer colors

Science News Letter, May 18, 1946



RADIO "HAMS"—The first invasion by amateur radio operators of a broadcast band used exclusively during the war by the Army and Navy for radar work was accomplished by W. C. White, right, electronics engineer of the General Electric Research Laboratory, and George H. Floyd, Electronics Department engineer. With the use of homemade equipment, they completed the first two-way radio telephone conversation on the 2300-3450 megacycle band between two buildings seven-tenths of a mile apart.

METEOROLOGY

Ocean Weather Studied

Distant thunderstorm areas are being studied by means of pulse characteristics of electromagnetic disturbances from lightning discharges.

➤ A SYSTEM of determining weather conditions over ocean stretches, particularly of distant thunderstorm areas, is under study It involves a study of the electrical static in such regions

Thunderstorms constitute one of the most serious hazards faced by aircraft, the International Scientific Radio Union and Institute of Radio Engineers meeting were told by three scientists who described studies being made of "Sferics", the pulse characteristics of electromagnetic disturbances resulting from lightning discharges

They are Sholom Kass, Lawrence A Pick and Albert C Trakowski, Jr., of the Army Signal Corps Engineering laboratories Specially designed sferics direction finding networks of three or more widely separated stations have yielded very favorable results, they said

Static direction finders are used in the stations. The apparatus consists of a cathode-ray indicating tube similar to those used in radar and television, and two mutually perpendicular receiving loops and amplifiers

"It is now generally accepted that nearly all atmospheric radio signals, or sferics, emanate from lightning discharges," they stated "It is possible that there are electrical discharges in thunderstorms which are not connected with visible flashes, and that weak sferics of short range may emanate from these nonvisible discharges"

"The pulses produced by lightning may properly be considered as emanating from natural loran or radar transmitters," they continued, "and their qualities may readily be compared to those of man-made systems, except that they do not resemble R F pulses but rather are similar to the output pulses of a keyer or modulator."

Science News Letter, May 18, 1946

More than half the *carbon bisulfide* produced in the United States is used in the manufacture of rayon, cellophane and other viscose products; the next greatest use is in making carbon tetrachloride.

Zirconium metal, obtained from zircon sand, is easily drawn into wires or rolled into thin sheets, it is widely used in electronic tubes, electric condensers, X-ray filters, lamp filaments, spot-welding electrode and photo-flash bulbs.

ENGINEERING

Eyes Have Same Limitations as Cameras

➤ YOUR EYES have the same ultimate limitations as a photographic film or a television pick-up tube, but the eye is 250 times as effective in viewing as a camera is in taking motion pictures

Comparing human eyes with movie and television cameras, Dr Albert Rose of the RCA Laboratories, Inc, told the Society of Motion Picture Engineers that a unified approach to the limitations and possibilities of the three picture pick-up devices would help the study of "seeing" media

The great limitation to what we can see with our eyes is "the discrete nature of light flux," and the same is true for photographer's film and the television set's pick-up tube, according to Dr Rose

He said that terms used in studying human vision, television and photography should be standardized For example, Dr Rose said that what is called minimum discernible contrast in eyesight becomes graininess in films and signal-to-noise ratio in television

Comparing the eye with a camera, he reported that not all the greater effectiveness of the eye can be attributed to a lower quantum efficiency of film. Part of the eye's greater vision power is a result of the high gamma of the printed film which requires a higher than normal signal-to-noise ratio, he said

Science News Letter, May 18, 1946

GEOGRAPHY

Common Geographical Groundwork Planned

➤ ALL THE WESTERN hemisphere will have a common basic groundwork of maps, surveying networks, earthquake recording and historical research when cooperation begun at a meeting in Mexico City of officials of the Pan-American Institute of Geography and History comes to fruition

More than a dozen experts from five countries made plans for international meetings in August at Caracas, Venezuela, when the Fourth General Assembly on Pan-American Geography and History and the Third Pan-American Cartographic Conference will be held.

Brazil, represented at the meetings by Dr Christovam Leite de Castro and Dr Jorge Zarur, has offered to support for two or three years an international committee on geography to be a part of the UNO as well as serve the western hemisphere

Use of a uniform method of triangulation and other geodetic methods and coordination of all mapping by various countries is the problem of another committee Hemisphere-wide reporting of earthquakes is another project. A history commission is also being studied

Representatives from the United States in attendance included Robert H Randall of the Coast and Geodetic Survey, Dr Wallace W. Atwood, the geographer, Dr Andre C Simonpietri of the Department of State, Dr Lewis Hanke of the Library of Congress, Capt Clement L Garner, U S Navy, Lt Col Albert G Foote, Army Air Forces, and Com George F Kennedy, U S Navy

General Eduardo Zubia represented Uruguay at the conference, while Engineer Arturo Posnansky attended from Bolivia Mexican representatives on the committee were Lic Silvio Zavala, Engineer Pedro C Sanchez and Engineer Alfonso Vaca Alatorre

Science News Letter, May 18, 1946

CHEMISTRY

Deodorized Gas Endangered Bank

➤ A DISASTROUS explosion might have been the price of a new bit of information about city gas chemistry If one of the bank clerks had been tempted to light a cigarette while he was working in that underground vault—

Here's the story.

Clerks in a Colorado bank complained of headaches and nausea when they worked in the cellar vault No odor was noticeable, so at first gas was ruled out as a cause Finally, however, the State Division of Industrial Hygeine had an instrumental test made It showed air pollution by combustible gas close to the explosive limit

Gas used in this locality is a nearly odorless natural gas To give warning of leaks, a pungent-smelling compound, known technically as a calodorant, was mixed with it Gas men believed that nothing could remove this warning substance

The gas that got into the vault was traced to a leaky main about 50 feet from the bank It apparently seeped through the moist sandy subsoil, following a six-inch water pipe that passed through the vault, gaining entry via an apparently tight joint between the pipe and the concrete wall

Later laboratory tests showed that the "calodorated" gas could be deodorized by passing it through a mass of moist sand, confirming the field conclusions

Science News Letter, May 18, 1946

IN SCIENCE

CARTOGRAPHY-GEOLOGY

Large Size Glacial Map Of North America

➤ A GLACIAL map of North America, large size, is now available It presents the Pleistocene glacial features of the continent from the North Pole to Los Angeles, and from the Aleutians to Iceland It is published by the Geological Society of America

The map measures 79 by 52 inches, and is drawn at a scale of 72 miles to the inch It is the result of three years of work by a committee of American geologists Previous glacial maps have all been on a very small scale

Major topographical features are shown by form lines on the land and sea floor In this way the relation of the glaciated area to highlands and to continental shelves is brought out. Areas glaciated during each of the four Pleistocene glacial ages, and during the sub-ages of the last glacial age, are differentiated in color wherever a basis for differentiation exists A total of 23 different color conventions are used on the map

Science News Letter, May 18, 1946

ENTOMOLOGY

Insects Absorb Water From Vapor in the Air

➤ SOME INSECTS, at least, do not need to drink, their bodies are able to absorb water in vapor form from the air. This has been neatly demonstrated by two Belgian scientists, J Govaerts and J Leclercq, of the University of Liege, who report on their experiments in the British scientific journal *Nature* (April 13).

They kept several species of beetles and one bug species, without food, in closed vessels in which the air was saturated with water vapor. This was "tagged" by the addition of 8% of "heavy water", in which the hydrogen atoms have doubled their ordinary atomic weight

After a few days, some of the insects were killed and their body fluids analyzed It was found that in all species the water from their bodies contained 8% of heavy water—a clear demonstration that they had taken it directly from the air until they were in equilibrium with it

Science News Letter, May 18, 1946

E FIELDS

MEDICINE

Cure for Colds May Come From Polio Contributions

➤ A CURE for colds may possibly come out of the $204,000 grant to Harvard Medical School from the millions of dimes contributed by Americans to fight infantile paralysis

A study of filtrable viruses is the purpose of the National Foundation for Infantile Paralysis grant

Infantile paralysis is caused by a filtrable virus. The common cold is caused by another virus Viruses are also the causes of diseases ranging from cold sores and fever blisters to mumps, measles, influenza and encephalitis, popularly called sleeping sickness

A study of filtrable viruses attacks a broad front of diseases of plants and other animals as well as humans

How well a fundamental attack such as this pays off is seen in the chemical warfare studies which produced a cure for bichloride of mercury poisoning and promise better treatments, if not cures, for other diseases

Even closer to the virus study is the discovery from fundamental research that viruses, which could not be propagated in test tubes, would grow on chick embryos where they were accessible for study without use of laboratory animals From this came the vaccine that protected our troops from typhus fever, a vaccine against influenza and an improved vaccine against yellow fever

Science News Letter, May 18, 1946

PHYSICS

Bombers and Rockets Investigate Cosmic Rays

➤ BOMBERS and rockets are attacking the problem of cosmic rays instead of fighting Nazis or Japs.

A Nazi V-2 rocket was fired on May 10 from the desert White Sands region in New Mexico by the Army In its nose instead of explosive was an apparatus to measure the intensity of cosmic rays at a hundred miles above the earth, higher than any measurements have ever been made

Later this month a specially equipped B-29 bomber will begin taking cosmic ray recorders on round trips between the northern border of the United States and the magnetic equator flying at 35,000 feet (seven miles) and lower altitudes This is a cooperation of the Army Air Forces, the Franklin Institute's Bartol Research Foundation and the National Geographic Society The B-29 flights will provide cosmic ray measurements through a 70-degree range of latitude, important because intensities vary with distance from the equator

Plunging into the atmosphere from outer space, cosmic rays of great energy constantly bombard the earth and create secondary radiation.

Mesons (or mesotrons), which are atomic particles with a life of only a few millionths of a second, are a product of cosmic ray bombardment These will be investigated during the cosmic ray researches Cosmic rays are recorded with an apparatus called a Geiger counter

Science News Letter, May 18, 1946

INVENTION

Further Steps Toward Mechanized Cotton Growing

➤ TWO FURTHER steps towards putting cotton growing on a fully mechanized basis are represented in new patents on a cotton chopper and a cotton harvester The first, No 2,399,854, was taken out by William H Clark of Riverside, Calif , the second No 2,399,718, was granted on a joint application by David B Baker also of Riverside, and Clarence R Hagen of Chicago, who have assigned their rights to the International Harvester Company

Cotton chopping consists in making gaps in the rows of seedling cotton plants, so that those left standing may grow larger and bear more heavily For the traditional hand hoe Mr Clark substitutes a machine with a large rotating disk carrying a series of revolving cross-shaped cutters, with spaces between them Where the cutters hit the cotton row they knock out young plants, where the spaces come opposite the row the plants are left standing

The principal objective of the Baker-Hagen harvester is to prevent piling up of the cotton, with resultant clogging, after the bolls have been picked This is accomplished by means of two fans, one of which sucks the cotton into an intermediate chamber, while the other blows it out of this into a hopper on the tractor, from which it can be dumped into collecting trucks Both fans are so screened that the cotton cannot get to them and put them out of action.

Science News Letter, May 18, 1946

OCEANOGRAPHY

Soviet Arctic Research Conducted Throughout War

➤ RESEARCH by Russian scientists on the fisheries resources of the Barents sea, the sector of the Arctic ocean directly north of European Russia, went on throughout the war, under the very guns of the enemy

The saga of the persistent and hardy researchers, who did their work in trawlers and other small craft while the waters were infested with submarines and the air never safe from bombers, was told by Prof Mikhail Somov, director of the Arctic Institute of the USSR Prof Somov has received many honors for his lifelong work on Arctic marine biology, including the Order of the Red Banner of Labor

Before the first World War, the Barents sea was considered a poor place to look for fish, but investigations started under Lenin's instructions in 1920 showed it to be an excellent food-producing area, especially for cod, haddock, herring and salmon Movements of the schools of fish are governed largely by the perpetual clash between warm and cold, where an ultimate branch of the Gulf Stream enters the sea and meets the frigid Arctic waters

Working conditions for fisheries researchers in these high northern waters are always hard They have to contend with raging Arctic storms, and for months on end they must work without a glimpse of the sun When Nazi torpedoes, gunfire and bombs were added to their other difficulties, however, they still carried on Two of their best ships were lost, and many casualties caused by enemy action, but the militant scientists refused to give up Now the waters, though never quiet, are at least rid of human enemies, and research can go on in relative peace

Science News Letter, May 18, 1946

CHEMISTRY

Chemistry Award Given Nutritionist

➤ DR ICIE Macy Hoobler of Detroit, director of the research laboratory of the Children's Fund of Michigan, will be awarded the Francis P Garvan Medal honoring women in chemistry, the American Chemical Society reports

Dr Hoobler, an authority on nutrition and child growth, will receive the gold medal at the chemical society's national meeting at Chicago in September.

Science News Letter, May 18, 1946

AGRICULTURE

Well-Bred Potatoes

Scientific work done in the past few decades is yielding disease-resistant, smoother spuds. Twenty-five new varieties released by the Department of Agriculture.

By JOSEPHINE HEMPHILL and DR. FRANK THONE

➤ POTATOES are ammunition in our battle against world famine We are urged to eat them in place of part of our bread, so that wheat may be shipped to hungry folk overseas They would be glad to get potatoes if we would send them instead of wheat, but potatoes contain a lot of water, so it is more practicable to keep them here for our own use and ship the drier, more compact wheat

That we have good potatoes to eat nowadays is due very largely to scientific work that has been done in the past few decades, to make potatoes bigger and better, and above all to make them grow in defiance of the numerous fungus and other diseases that lie in wait for them in the fields.

How much we owe to plant breeders for the improvement of potatoes can be judged from a glance at the earliest published picture of a potato plant and its tubers, which appeared in 1597, in the famous *Herball* of the early English botanist, John Gerard The potatoes are depicted as rough and irregular, and not very large As far as one can tell from the number of them shown among the roots of the pulled-up plant, these early potato vines were not very heavy yielders, either

Even so, the potato variety that John Gerard knew only a century or so after the discovery of America was already a considerable improvement on its ancestors. Primitive potatoes, as shown by pottery models found in ancient Peruvian tombs, were small and had such deep-set eyes that they seem to have been mere collections of hollows and humps

Despite this early botanical knowledge of the potato in England, its cultivation was slow in reaching the American colonies According to the earliest known authentic records, the potato was first introduced in 1719 by a colony of Presbyterian Irish in New Hampshire This first stock of seed potatoes came from Ireland—so it seems that the much-contested name "Irish potato," has some justification after all Colonial New Englanders didn't care much for this new vegetable, and little was done to improve it In fact, it was not until about a century ago, in the 1840's, that really serious efforts toward improvement by breeding were started

There was reason for such efforts in that decade. A wasting fungus disease, known as late blight, was wiping out crop after crop across wide areas Hardest hit was Ireland where in the "black summer" of 1846 thousands died of starvation That famine is credited with starting the tidal wave of Irish immigrants whose descendants now form a highly important segment of the American population

The Irish, who can always sing about their troubles, made a song about the disastrous failure of their principal food crop It is now known chiefly in the form of humorous parodies, but the original version was not funny at all:

> "Oh, the praties they are small
> When we dig them in the fall,
> And we eat them coats and all,
> Full of fear, full of fear."

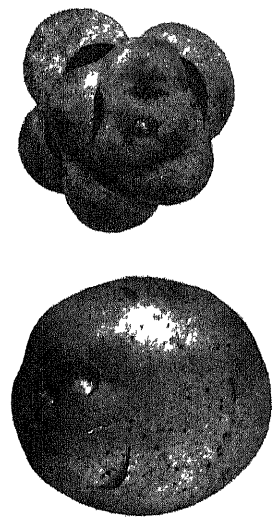
In this country, a mistaken theory arose that potatoes had lost their vigor through many generations of propagation by cuttings only, and that if new kinds could be started from seed the blight would not harm them The Rev Chauncey Goodrich of Utica, N Y, a leading advocate of this doctrine, in 1857 originated one of the first improved potato varieties, the Garnet Chili, from seed of South American stock It was a good potato, but still not blight-resistant From this variety sprang a number of other famous lines including the well-known Burbank, Early Rose, Green Mountain and Triumph.

Although potatoes continued to be improved through the rest of the nineteenth century, really scientific potato breeding could not get under way until the rediscovery of Mendel's principles of genetics, in 1900 Then scientists could begin to fit definite characters, such as disease resistance, smoother shape and heavier yield, together like stones in a mosaic picture The U. S Department of Agriculture, with the cooperation of some 35 state and territorial experiment stations, is working on a unified potato breeding program inaugurated in 1929

In their breeding work, the scientists have a large number of hereditary characters to shuffle and recombine Whenever they find that a new seedling variety is better than the old kinds in at least one important character, this seedling is released to growers in the part of the country to which it is best adapted

So far more than 25 new varieties have been thus released First was Katahdin, introduced in 1933 This is a fine-shaped potato, shallow eyed, of good cooking quality, and resistant to mild mosaic, a virus disease that is a worse enemy of potatoes than late blight In 13 years Katahdin has become the most important of all late potatoes.

Katahdin, however, is still not blight-resistant So the breeders went back to work on that problem After making many crosses they selected one, subsequently named Sebago, that has good



OLD AND NEW—Ancestor and descendant: a primitive Peruvian tuber, all eyes and lumps (top), compared with a modern "smoothie" that even a GI stuck with KP would love to touch.



CRADLE-SONG—Seedlings of new potato hybrids are started and carefully tended in this Department of Agriculture greenhouse.

qualities to recommend it, and is resistant to other diseases besides blight

Still the breeders are not satisfied Potatoes that appear to be even better than Katahdin are being developed One, a New York State variety named Empire, has already been released Others are still known only as serial numbers in the breeders' books Each adds something to quality in the pot, and each promises greater resistance to fungi, viruses and other potato plagues

After a hundred years, the "dread potato disease" of the famine days seems to be on the way out

Science News Letter, May 18, 1946

ENGINEERING

Engine Ignition System Needs No Spark Plugs

➤ NO SPARK plugs are needed in a method of igniting airplane and other internal combustion engines in a method developed by German engineers

The method, known as the "ring-process", was designed to eliminate spark plug fouling and ignition difficulties in aircraft at high altitudes

Ignition is effected by spraying a liquid ether into the combustion chamber at the time of the compression stroke The liquid may be budadiol diethyl or diethyl glycol ether. It ignites at the temperature of the cylinder and thus sets off the combustible charge

This process is one of those secured in Germany by American scientists It is fully described in a report now available from the Office of the Publication Board, U S Department of Commerce

Science News Letter, May 18, 1946

GENERAL SCIENCE

Science Association Buys Site for Headquarters

➤ A CITY BLOCK in downtown Washington has been purchased by the American Association for the Advancement of Science, general organization of scientists, as the site for its national headquarters

Bounded by Massachusetts Avenue, N Street and 15th Street the triangular area just off Scott Circle now contains four buildings, one of which houses the National Air Transport Association It is understood that a new building is planned for the site

At present the AAAS has offices in the Smithsonian Institution building and at American University

Science News Letter, May 18, 1946

The simple process of spraying the flower clusters of *tomato plants* with a chemical solution containing a hormone results in tomatoes that are larger and contain more meat; also the yield is larger and the plants mature earlier.

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Do You Know?

America made 6,000 tons of *synthetic rubber* in 1941 and 700,000 tons in 1945

A ready-mixed *paint* is now available that gives a close natural silver chrome finish

Though *rayon* is indigestible to clothes moths it is eaten by silverfish, which are wingless insects.

A new magnetic alloy, called *silmanal,* is magnetized across its width rather than along its length, as a compass needle it points east and west

Lespedeza, now regarded as one of the most valuable crops for forage, green manuring and soil erosion prevention, was known in the South a century ago as a "harmless weed"; its value has been appreciated only in the past 25 years

The Para rubber tree, *Hevea brasiliensis,* is extremely variable in yield, especially in upper Amazon regions, because of this scientists believe that high producing plantations can be developed from selected cuttings

SECRETS OF INDUSTRY

BY LEWIS C. ORD

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ELECTRONICS

Revolution in Radio

A television tube no bigger than a pocket flashlight, radio waves created at the rate of 5,000,000 a second and up among war developments.

➤ RADIO WAVES created at the rate of 5,000,000 a second and up, television tubes no bigger than a pocket flashlight yet almost able to see in the dark, and other wartime miracles of electronic communication were described before the meeting of the National Academy of Sciences by Dr. O E Buckley, president of the Bell Telephone Laboratories

Dr Buckley limited his discussion to radio communication, excluding radar and kindred devices as being too vast a field for brief description, and wire communciations because they were not essentially different from systems in common use.

Although the basal network of wires handled the bulk of military communications, he said, revolutionary things had to be done with radio to take care of the highly mobile combat units, all the way from airplanes to foot-slogging infantry companies And revolutionary things, accordingly, were done by the physicists and engineers whose business is radio

The speaker described a new development known as velocity modulation In this the electrons are sent out in bunches, instead of in a steady stream This manipulation literally lifted the radio ceiling, making frequencies up to 5,000 megacycles possible It was in this newly-opened-up realm of very short waves that the techniques of frequency modulation and pulse modulation were most usefully exploited.

In pulse modulation, Dr Buckley explained, the signal is not carried on a steady band as in ordinary low-frequency radio, but on an intermittent band whose "breaks" come at almost unimaginably close intervals One of the uses of pulse-modification radio was the transmission of multiplex telegraphic messages at very high speeds A late development in pulse modulation was a portable antenna in the form of parabolic mirror mounted on a quickly erected tower, which gave highly directive transmission with signals of only two watts' power to a range of 20 miles The beam could carry eight telephone conversations at the same time, or 18 printing telegraph circuits Relays could extend the range apparently indefinitely, tests carried it as far as 4,000 miles.

These intensely high frequencies and the very close adjustments they required called for great numbers of accurately-cut quartz crystals More than 80 million crystal units for frequency control were made in this country, Dr Buckley stated.

The great bulk of overseas communication was handled by telegraph, he continued Transoceanic telephone conversations were largely limited to "contacts of high rank and urgency" Transoceanic radiotelegraphy was made much more reliable than it had been in prewar times One device that helped greatly was the use of two receiving antennas separated by a few wavelengths Since the fading out of radio signals is extremely unlikely to occur at both receiving points at the same time, the likelihood of legible signals is much increased, Dr Buckley pointed out.

Science News Letter, May 18, 1946

SEISMOLOGY

Strong Earthquake West of Sumatra

➤ A STRONG earthquake shook the Indian ocean floor at a spot about 150 miles west of Sumatra at 20.4 minutes after midnight, on the morning of May 8 The epicenter was in the general region of latitude 2 degrees south, longitude 98 degrees east. There was a major earthquake very close to this locality on Dec 28, 1935, it was in the same longitude, but 1 5 degrees nearer the equator

Seismograph stations reporting by wire and radio were: New Zealand Observatory at Wellington, N. Z, Dominion Observatory at Ottawa; observatories of the Jesuit Seismological Association at St Louis, Georgetown and Fordham Universities and Weston College, and the observatories of the U S. Coast and Geodetic Survey at San Juan, P R, Tucson, Ariz, and Sitka and College, Alaska

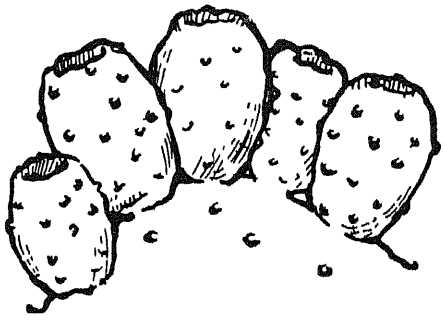
Science News Letter, May 18, 1946

A *synthetic wax,* based on German processes now released in America, is claimed to be as good as natural Carnauba wax obtained from the wax palm grown in Brazil

HORTICULTURE

NATURE RAMBLINGS

by Frank Thone



Harmful Hero-Worship

➤ LUTHER BURBANK worked hard and productively for half a century, breeding and distributing new plant hybrids through an astonishingly large range of varieties—all the way from potatoes to plums He was extravagantly admired by the public at large, and he amassed a moderate fortune. One thing, however, was wanting most scientists withheld the recognition which he craved from them Their chilly attitude toward him was a source of much distress and bitterness, especially in his later years

Most of this grief was unnecessary, and resulted not from anything Burbank himself did or said, but partly from the intemperate reaction to criticism of their idol on the part of his all-out admirers, partly from extravagant claims made for some of his productions by commercial firms and promoters who exploited his popular reputation for their own profit This at least is the thesis of Burbank's newest biographer, Dr Walter L Howard, emeritus professor of pomology at the University of California, whose book, *Luther Burbank, a Victim of Hero Worship,* has just been published by the Chronica Botanica Company

Burbank, his sympathetic interpreter admits, had some qualities that by themselves made him a bit difficult to get on with He was a good deal of an egotist, believing intensely in himself and his work, he was unsystematic about keeping records and he was very stubborn in the face of efforts to induce him to change any of his methods The latter two things were mainly responsible for the failure of the Carnegie Institution's effort to make a collaborator of him

Two especially unfortunate cases of reckless exploitation of the Burbank reputation by unscrupulous promoters were the spineless cactus craze and the affair of the Wonderberry Burbank really did originate a hybrid cactus without spines, or practically so, Dr Howard has decided after reviewing the evidence But the men who undertook to market it used such "blue-sky" methods, and were so greedy in the matter of price, that the plant never got a chance to take its proper (and rather modest) niche in dry-land agriculture The Wonderberry was a hybrid belonging to the nightshade family Of moderately good qualities, it was puffed beyond its merits by the promoters, with inevitably disillusioning results

Of the thousand or so hybrids which Burbank probably made, Dr Howard selects as lasting monuments only a few His first achievement, the Burbank potato, is still cultivated after 70 years The Burbank hybrid plums (including prunes) are now grown on a large scale in California His winter rhubarb is still good in regions with mild winter climates Of his flowers, probably the Shasta daisy is best known, though he also scored successes with lilies, gladioli, amaryllis and several others

Science News Letter, May 18, 1946

INVENTION

Wine-Making Put on Mass-Production Basis

➤ WINE-MAKERS of ancient lands, "trampling out the vintage" with purple-stained feet, would stare in gaping amazement at a grape-processing machine on which U S patent 2,398,440 has been issued to Georges Monnet of New York Its massive mechanism puts on a mass-production basis one of the most ancient of the arts—attributed, indeed, to no less a worthy than Noah.

Grapes brought in boxes from the vineyard to the Monnet machine are dumped upon a copper-screen conveyor and given a thorough washing with jets of water, then passed on through a warm-air drier From this they go down a second conveyor and through three successive sets of rubber rollers

The first merely cracks their skins and lets the prime juice trickle out. It is collected in a funnel-like trough, which directs its flow over a chilling coil, to precipitate out impurities, leaving the juice ready either for fermentation or for bottling unfermented. The second and third sets of rollers, set a little tighter, squeeze out second and third grades of juice The squeezed-out grapes are freed of stems, seeds and skins by mincing with a battery of knives and subsequent centrifuging, which leaves the pulp in condition for marmalade-making or other uses

Science News Letter, May 18, 1946

ENGINEERING

Carbon Black Qualities Without Discoloration

➤ A NEW material will give rubber the same qualities as carbon black without discoloration, but finding a name for the substance is proving a headache to B F Goodrich engineers

It could be called "white carbon black" or "carbon white," except that it isn't made of carbon Produced by a series of chemical reactions on sand, "fumed silica" is the most accurate name, according to chemists

Still many months away from commercial use, the new process will mean not only superior white sidewall tires, but tires and rubber products of all sorts of any color

Science News Letter, May 18, 1946



Photo courtesy H-B Instrument Co

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ECONOMICS OF THE POTASH INDUSTRY—Jules Backman—*American Potash Institute,* 55 p, tables and maps, free

THE HOME DEMONSTRATION AGENT—*Government Printing Office* 38 p, illus, paper, 15 cents The work of the county home demonstration agent among rural families U S Department of Agriculture, Miscellaneous Publication No 602

IF YOU WANT TO BUILD A HOUSE—Elizabeth B Mock—*Museum of Modern Art,* 96 p, Illus, $2 A photographic survey of modern architecture with a simply written analysis of problems in home planning, designing and construction

LABORATORY MANUAL OF ORGANIC MEDICINAL PRODUCTS—Walter H Hartung, W T Sumerford, and Melvin F W Dunker—*Univ of Georgia Press,* 102 p, diagrs, paper, $2 25 Directions for carrying out laboratory exercises dealing with the chemistry of organic medicinal products and the related compounds Designed for the student who is familiar with the fundamentals of inorganic and organic chemistry

MANUAL OF CHILD PSYCHOLOGY—Leonard Carmichael, ed—*Wiley,* 1068 p, tables and illus, $6 An advance level textbook, presenting a series of separate chapters, each written by a recognized authority, the purpose of which is to provide an accurate and coherent picture of some of the most important aspects of research in the scientific psychology of human development

1946 MODERN PLASTICS ENCYCLOPEDIA—*Plastics Catalogue Corp,* 1389 p, tables and illus, $6 More than 135 separate chapters covering different phases of plastics manufacture, properties and use The book is written in plain non-technical language, and can be used by the layman and the engineer, the businessman and the designer, the student and the member of the plastics field

PERSONAL HYGIENE APPLIED—Jesse Feiring Williams, M D—*Saunders,* 564 p, tables and illus, $2 50, 8th ed textbook for students beginning their college careers A revised edition containing new material on fitness and exercise, posture, nutrition, dental caries, etc

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POPULATION AND PEACE IN THE PACIFIC—Warren S Thompson—*Univ of Chicago Press,* 397 p, tables and maps, $3 75 An analysis of the raw-material resources, agriculture industrial production, and economic future of each of the vast regions composing the Pacific world Australia and New Zealand, Oceania, Indonesia, Manchoukuo, China, India, and Japan

PRINCIPLES OF DESIGN THAT AFFECT THE OPERATION OF A NATURAL CIRCULATION KILN—Roy M Carter—*Northeastern Forest Experiment Station,* 8 p, illus, free Forest Products Paper No 3

SCIENTIFIC, MEDICAL, AND TECHNICAL BOOKS Published in the United States of America 1930-1944—R R Hawkins, ed—*Bowker,* 1114 p, $20 A selected list of titles in print with annotations The selections on a given subject represent those volumes that should be available in a well-stocked American library specializing in that subject Copies are distributed in Latin America by the Office of International Information and Cultural Affairs of the State Department and in Europe by the U S International Book Association

STATISTICAL THERMODYNAMICS — Erwin Schrodinger—*Cambridge Univ. Press,* 88 p, $1 50 A course of seminar lectures delivered in January-March 1944, at the School of Theoretical Physics, Dublin Institute for Advanced Studies

TREATMENT OF ARTHRITIS AND RHEUMATISM IN GENERAL PRACTICE Particularly in Women—Bernard Aschner, M D—*Froben,* 340 p, $5 A different approach to the problem, which may be questioned by other physicians

WHAT'S AHEAD FOR ME My Occupation, My Marriage, My Education—Archie J Baum—*Hogg Foundation,* 29 p, paper, 25 cents Suggestions aimed at helping the college freshman plan his own future in three areas of student choice, Dr Bahm gives sources of information regarding each area

Science News Letter May 18, 1946

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ENTOMOLOGY

Wigglers in Warm Water Die Sooner with DDT

➤ INSECT LIFE and death are influenced by the rise and fall of the thermometer quite as much as our own—even more so, since insects are cold-blooded animals and respond to temperature changes more readily than we do Two striking examples of this fact were brought out in the meeting of the Entomological Society of America by two University of Minnesota researchers, Dr Hsing-Yun Fan and Dr A C Hodson

Chinese-born Dr. Fan tried the effects of different temperatures on the effectiveness of DDT against the larvae, or "wig-

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PATON RANCH, SHELL, WYOMING

glers", of several different species of mosquitoes, among them the dreaded *Aedes egypti,* carrier of yellow fever He kept batches of the larvae in chilly water for a time, then warmed it up to summer temperature, at the same time adding DDT in the proportion of one part of the poison to ten million parts of water In general, the warmer he made the water, the deadlier was the effect of DDT at that concentration.

Dr Hodson found that the eggs of the all-too-common pest, the tent caterpillar, will not complete development and hatch until they have been given a thorough winter chilling In this they are like the buds and bulbs of many plants, which also must be nearly frozen before they will sprout.

The moth of the tent caterpillar lays its eggs in high summer, Dr Hodson stated An embryo caterpillar starts to develop inside the egg, but at the end of three weeks it stops and becomes dormant, and only when the weather warms up in the following spring does it wake up, complete growth, and come out of the shell Eggs brought into the laboratory and kept at summer temperature never hatch But if they are kept near freezing-point for several months and then warmed up, they hatch readily.

Microscopic examination of the insides of the unhatched caterpillars showed that they contained part of the stock of food originally in the egg's yolk. As they warm up and start growing again, this gets used up—and then the little pests finally hatch and get to work on leaves Dr Hodson said that it has been suggested that the caterpillars hatch because they get hungry when the original food-stock is used up

Science News Letter, May 18, 1946

GEOLOGY

Big Beds of Bauxite In Northwest Oregon

➤ ALUMINUM-PRODUCING plants in the Pacific Northwest, powered by the great, recently-built hydroelectric installations, may before long be getting their ore from nearby sources Great deposits of bauxite in northwestern Oregon are described in *Economic Geology* (May), by F W Libbey, W. D Lowry and R S Mason of the Oregon State Department of Geology and Mineral Resources

The beds, which are mostly horizontal, vary from six to 20 or more feet in thickness The overburden is silt, from one to 50 feet thick, strip mining is therefore practicable

In addition to the bauxite, from which aluminum is extracted, the ore contains iron and some titanium dioxide, either or both of which may prove economically valuable This iron-containing bauxite cannot be treated economically by the process now used for aluminum production in this country, but there is a Norwegian process which is believed to be feasible for working it

The Aluminum Company of America is now exploring the deposits and conducting metallurgical tests on the ore

Science News Letter, May 18, 1946

CRYSTALLOGRAPHY

Hailstones Frozen Slowly X-ray Examinations Show

➤ X-RAYS turned on hailstones produced evidence that these icy pellets are not frozen in a hurry, but slowly, Kathleen Lonsdale and P G Owston of the Royal Institution report. (*Nature,* April 13) The diffraction pattern of the rays after passing through sections of the hailstones indicated that the ice was in large, solid crystals

"Good single crystals of ice can be grown in cold weather within an hour or two," the researchers comment, "but an abrupt cooling of water, say, by a freezing mixture or by liquid air, results in the formation of a coarse powder Our experiments show, therefore, that the hailstones were probably formed by a relatively slow fall of temperature in the air through which they passed "

Science News Letter, May 18, 1946

INVENTION

Ten Tons of Nazi Patents Being Sorted Here

➤ TEN TONS of Germany's best scientific and industrial know-how is being sorted out for American use

Seized by the United States Army in Germany, 146 packing cases that contain 10 tons of documents from the German Patent Office have been brought over for evaluation The job of picking out the material most important to American industry and science has been assigned the Office of the Publication Board of the Department of Commerce and the United States Patent Office

When the documents have been checked, the most useful will be published. The rest of the cache will be returned to Germany to help reestablish the German Patent Office, it was announced

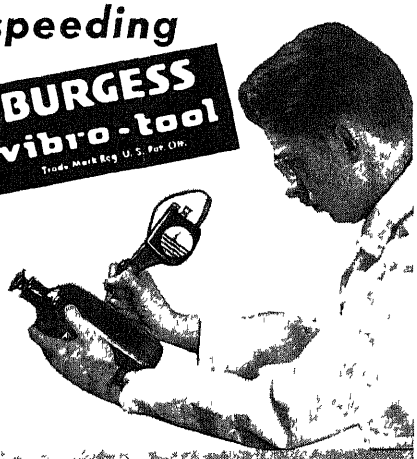
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Mexico is planning to produce its own *quinine*

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Science News Letter, May 18, 1946

⚙ *TWO-IN-ONE camera filter, which does the work of a standard yellow filter and a standard polarizing filter, is now available for black-and-white photography A sandwich of precision-dyed yellow plastic combined with a polarizer, it is laminated between glass disks of optical quality*

Science News Letter, May 18, 1946

⚙ *COMBINATION salt and pepper shaker resembles the ordinary shaker but has a Y-shaped partition upright in its center The leg of the Y separates the salt and pepper compartments, the two upper extensions are springs that can be pushed inward by tiny knobs and rods on the side, thus releasing either condiment*

Science News Letter, May 18, 1946

⚙ *SHOCK ABSORBERS for motorcycles mounted between the handle bars and the front axle fork cushion the jar between the front wheel, the handle bars, the motorcycle frame and the seat They are hydraulic shock absorbers similar to their big brothers used on automobiles*

Science News Letter, May 18, 1946



⚙ *GLASS FABRIC cover for an ironing board will not burn or char and provides a surface over which the iron glides smoothly and easily It can be cleaned with a damp cloth or dry-cleaning fluid without being removed from the board It looks like an ordinary cover, as the picture shows.*

Science News Letter, May 18, 1946

⚙ *COFFEE MAKER, recently patented, uses a special glass container or an ordinary fruit jar It consists of a wire bent to hold the jar by an attached handle, and a wire loop over the jar supported by the same handle The loop supports a conical fabric bag into which the ground coffee is placed and through which boiling water is poured*

Science News Letter, May 18, 1946

⚙ *DE-ICERS, electrically heated, prevent switches on electric railways from freezing. The device is a nine-foot wrought-iron pipe, with a heating element inside, that is buried a foot deep, paralleling the switch. The same power that operates the cars is employed in the 2,000-watt, 600-volt heater.*

Science News Letter, May 18, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St, N. W, Washington 6, D C, and ask for Gadget Bulletin 311*

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Question Box

CRYSTALLOGRAPHY

How quickly do hailstones freeze? p 319

ENGINEERING

How may rubber get carbon black qualities without discoloration? p 317

What engine ignition system needs no spark plugs? p. 315

What may make three-dimensional pictures for motion-picture theaters and home television screens possible? p 311

What method may bring better television images? p 308

ENTOMOLOGY

How has it been proven that some insects absorb water from the air? p 312

GEOLOGY

Where are large beds of bauxite located? p. 319

MEDICINE

What is alalen? p 307

MEDICINE-CHEMISTRY

What fast relief for migraine headaches has been announced? p 309

ORDNANCE

What is the purpose of the V-2 rocket tests in New Mexico? p 307

PHYSICS

How will gas cans be used in the atomic bomb test? p 309

SEISMOLOGY

Where was the strong earthquake of May 8 located? p 316

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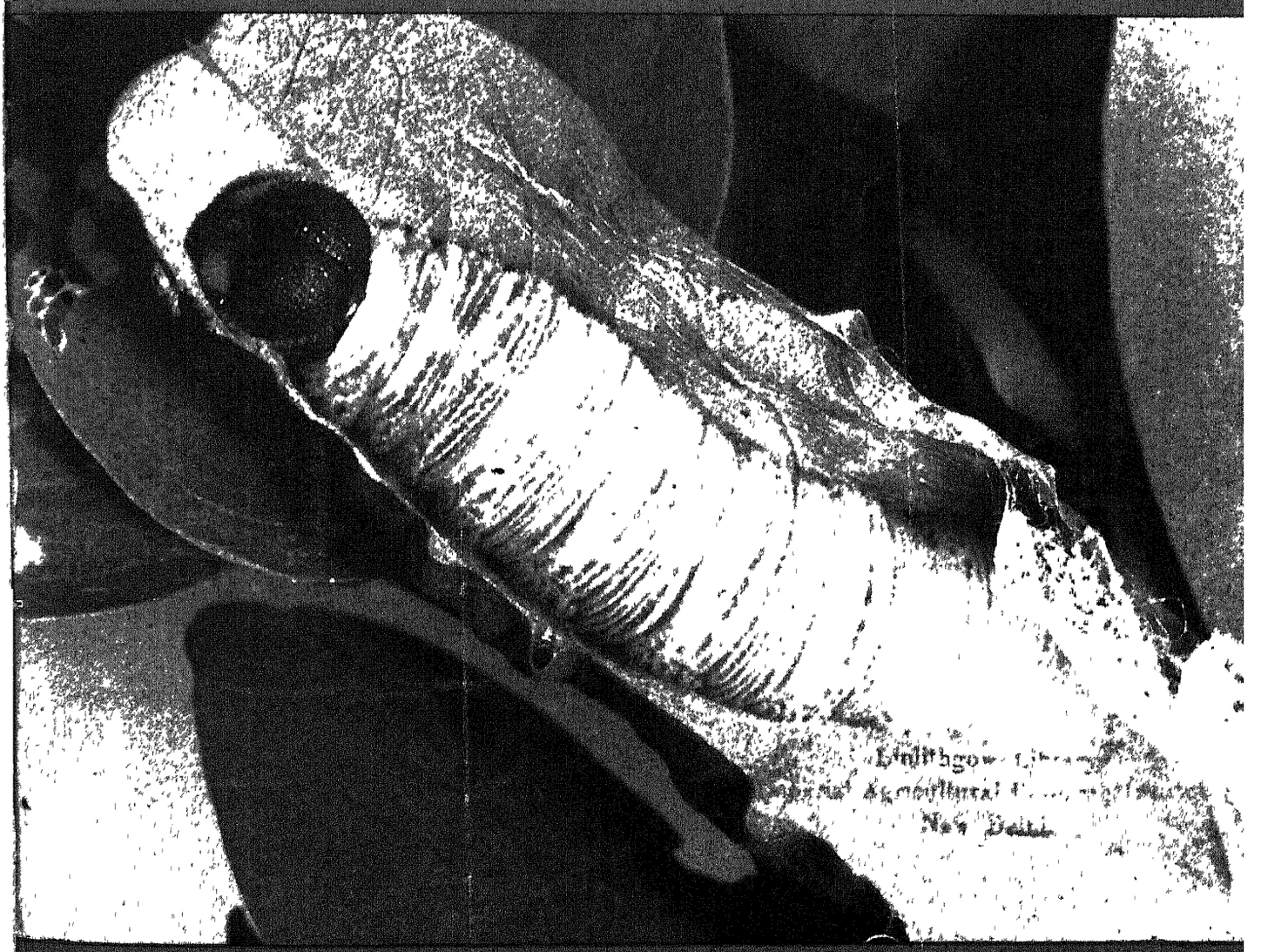
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SCIENCE NEWS LETTER

Vol. 49, No. 21

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MAY 25, 1946



No Housing Problem

See Page 328

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1921 TWENTY-FIFTH ANNIVERSARY 1946



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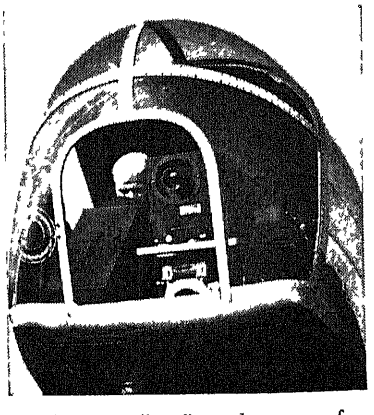
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MEDICINE

Remedy for Hemophilia

Wartime research which gave us plasma, albumin and other useful substances from human blood may bring a remedy for "bleeder's disease."

➤ A REMEDY for hemophilia, hereditary disease whose victims are always in danger of bleeding to death from a slight cut or scratch, may be coming from wartime research that gave plasma, albumin and other useful substances from human blood

Promising results in controlling hemorrhage in hemophiliacs with one of these substances were reported by Dr George R Minot and Dr F H L Taylor, of Harvard Medical School and Boston City Hospital, at the meeting of the American College of Physicians. A much greater trial with patients, they cautioned, will be necessary to determine the full usefulness of the material.

Hemophilia afflicts only men who inherit it through their mothers Their blood lacks a substance necessary to make blood clot when it is shed It is probable, the Boston physicians stated, that the antihemophilic property of normal plasma may be concentrated in a few milligrams of material This might mean as small an amount as a pinch of salt The material is a protein, known as globulin

With the use of this material and another substance from blood, thrombin, patients with hemophilia can now have teeth pulled and other operations performed without danger of hemorrhage Amputations and skin grafting have been done without serious complications. The thrombin, spread on or impregnated into sterile gauze, fibrin foams or absorbable cellulose, is applied directly to the bleeding point at operation It clots blood in a matter of seconds

An ultimate aim of the researchers is preparation of the antihemophilic material from normal plasma in a small enough volume so that hemophilia victims might use it prophylactically They might be able to give themselves a daily dose, as diabetics take insulin, to keep their blood clotting at the normally rapid time They would then be protected against serious hemorrhage in case of accidental injury, from the little bumps and bruises of everyday life to more severe ones

Dr Edwin J Cohn, the Harvard chemist whose fundamental researches led to this and other developments in the use of blood substances, was awarded the John Phillips medal, highest award of the American College of Physicians

Specific globulins which combine reversibly with iron and presumably transport it to the tissues of the body have been separated from other constituents of plasma, he reported Other substances he has separated are globulins which dissolve water-insoluble fatty substances such as cholesterol in large amounts, fatty vitamins such as vitamin A and fatty hormones such as the female sex hormone, estrogen, and globulin enzymes which split proteins and other complex chemicals Albumins separated from the blood have been found to combine selectively with organic metal complexes such as mercurials and the sulfa drugs as well as with water-insoluble organic molecules such as quinones and long-chain fatty acids

A more exciting phase of study of disease and exploration of unknown territory in its treatment are opening to doctors as a result of these studies, Dr Charles A Janeway of Harvard pointed out

Albumin, developed for treatment of shock during the war, has already proved extremely valuable, he reported, in treatment of all types of reduced protein in the blood but particularly in the acute form seen often in patients after operation, in diseases of the liver and in kidney disease

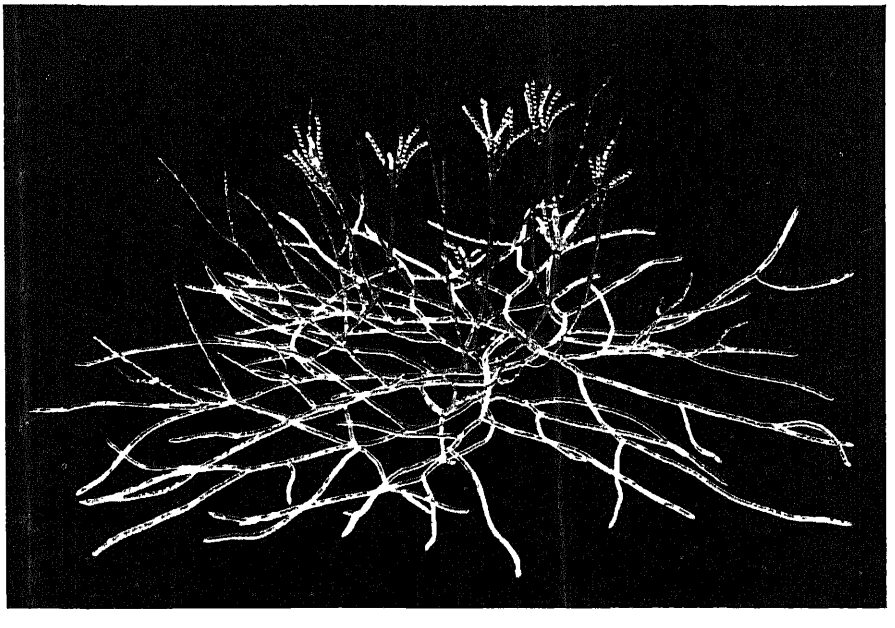
Science News Letter, May 25, 1946

MEDICINE

Weapon Against Botulism Forged Through Research

➤ A BETTER weapon against botulism, dangerous kind of food poisoning, can be forged as a result of biological warfare research carried out in greatest secrecy under the special projects division of the U S Army's Chemical Warfare Service

The weapon would be a more effective toxoid providing better immunity to this disease Such a weapon might have been



***PENICILLIUM MADE VISIBLE**—Model of a pinpoint fragment of the blue mold Penicillium notatum as seen magnified 400 times under the microscope. Note the spores on the upright filaments—it is these which impart the blue color to the fungus organism from which Sir Alexander Fleming first extracted the antibiotic substance. Photograph from the Chicago Natural History Museum Bulletin.*

needed for defending our troops if the enemy had used botulinus organisms in germ warfare against us

Steps toward developing this defensive toxoid are reported by Dr Carl Lamanna, Lt (j g) Olive E McElroy and Ensign Henning W Eklund (*Science*, May 17)

Pure white needle-shaped crystals of what is probably the most poisonous known substance per unit of weight were obtained by this group of scientists striving to build our defense against possible germ warfare, or "B.W" (biological warfare) as the scientists term it

On the basis of the amount the scientists found would kill a mouse, Dr Lamanna estimated that the killing dose for a 165-pound man would be roughly 0 15 gamma A gamma is a millionth of a gram and it takes almost 30 grams to make one ounce The material has about the density of water, but the killing dose would not approach in size even a single drop of water and is too small to be seen by the unaided eye

This very deadly material is a protein chemical and is believed the pure toxin which causes a severe botulinus food poisoning To obtain it, the scientists developed a complicated, eight-step method of separation, purification and crystallization

Science News Letter, May 25, 1946

ELECTRONICS

Peacetime Sofar

Will save lives of civilians ditched or wrecked on across-the-ocean trips by locating exactly the position of the plane or life raft.

➤ THE WAR-DEVELOPED SOFAR system of determining the exact location of a ditched plane or life raft in the open sea will soon play an important part in saving civilians ditched or wrecked on across-the-ocean trips How the system works was explained by three scientists largely responsible for its development Stations to cover the California-Hawaii air route will be installed this year

These scientists are Commodore J B Dow and Lt Comdr Walter Sands of the Bureau of Ships, U S Navy, and Dr Maurice Ewing of Columbia University, who during the war was director of research in physics for the Woods Hole Oceanographic Institution, Massachusetts All three were guests of Watson Davis, director of Science Service, on Adventures in Science, heard over the network of the Columbia Broadcasting System.

The SOFAR system, explained Commodore Dow, will make it possible to locate exactly the position of a ditched plane or life raft in the open sea by having three or more shore stations listen with hydrophones for the explosion of a light-weight underwater bomb dropped by the castaways

In case of a crash, the plane will release one of these bombs either before it ditches, or afterward, and the bomb will sink to a required depth where it is exploded by pressure, Lt. Comdr Sands added Each of the shore stations will detect the incoming signal, both over loudspeakers and visually on recorder tape

The recorder tape will also have second intervals marked on it so that each station will determine the exact time the explosion sound arrived. Each station will then radio the information to a central point at which, by reference to special charts and tables, it will be able to determine the location of the explosion to within a few miles even under the worst conditions Help to the survivors will then be dispatched

Dr Ewing explained how the sound waves travel thousands of miles under water While engaged in prewar studies and trial tests of the passage of sound under water, he discovered that sound could be heard for horizontal distances of thousands of miles if wasteful reflections could be eliminated, and if sensitive amplifiers and detectors were used to aid the ear

"Oceanographers had already determined the speed of sound at various depths in the ocean, and found a minimum velocity at a certain depth, with higher velocities above and below," he stated "The ray paths followed by sound in water are refracted toward regions of lower velocity Thus, if a small bomb is fired at depth of minimum velocity, a considerable portion of sound from it will be refracted up and down, crossing and recrossing this depth and never encountering surface or bottom"

The underwater sound channel used in SOFAR is over 3,000 feet below the surface In this channel sound waves take 20 minutes to travel 1,000 nautical miles, equal to about 1,130 land miles The sounds are picked up by hydrophones lowered into the channel In tests, a listening station in the Bahamas was able to pick up sound signals from bombs dropped 3,100 miles away No other natural or man-made sound had ever been heard more than a fraction of this distance, one of the scientists stated

Science News Letter, May 25, 1946

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MEDICINE

New TB Treatment

Patients actually stop breathing for hours at a time in the new iron lung which is being tried in the treatment of tuberculosis.

➤ A NEW KIND of iron lung, which actually stops the breathing for hours at a time, has restored health to six out of 12 patients with advanced tuberculosis of both lungs, Dr Alvan L Barach of Columbia University College of Physicians and Surgeons reported to the American College of Physicians

The patients stop breathing for the eight to eleven hours they spend daily in the new apparatus No movement of the ribs or diaphragm can be detected even by X-ray pictures The patients lie relaxed without moving and for the most part are not even bored though some use the radio for amusement

Air is wafted in and out of their sick lungs by the apparatus which, through a special device involving a collar around the neck, equalizes the pressure on both sides of the chest wall as well as the upper and lower surface of the diaphragm This pressure-equalizing feature is the chief difference between the new apparatus and the iron lung used for polio victims. Because the pressure is equalized, the lungs are completely at rest and cavities in them heal

Patients who were not helped by other methods of treatment recovered after one to three courses of the non-breathing treatment Two of the recovered patients have been well and at work for four years A single course of treatment takes three to four months during which the patient spends eight to eleven hours every day in the apparatus

The patients have to learn how not to breathe They may learn this in a few hours but some take two or three days At first their sinuses and ears bother them The effect of the oscillating pressure on the ear drum is like that of swift ascent and descent from high altitude A sponge rubber cover over the ears or a radio microphone lessens this feeling and in all cases the patients become oblivious to it Vasoconstricting nasal spray helps relieve the sinus congestion

The effect of stopping breathing on the central nervous system is of considerable interest, Dr Barach pointed out The patients lie for hours without moving their hands or changing position The desire to smoke disappears even in those used to smoking two packs of cigarettes daily

Dr Barach has been working on this method of putting the lungs at complete rest for nine years and says the ideal has not been achieved He hopes that other investigators will try the method so that further improvement and appraisal of its value will be made Latest improvement in the equalizing pressure chamber has been air conditioning Patients apparently do not get claustrophobia and after they have learned to stop breathing they either do not object to the treatment or actually like it

Science News Letter, May 25, 1946

MEDICINE

Emotional Disturbances Create Aches and Pains

➤ UNCONSCIOUS, smoldering resentment, frequently aroused by marital difficulties, is the cause of many of the nagging backaches and other muscular aches and pains, fatigue and lack of energy which are often diagnosed as fibrositis, Dr Edward Weiss of Philadelphia told members of the American Society for Research in Psychosomatic Problems

Of the 40 patients he reported, all but five were women and only four of the women were unmarried

These unconsciously resentful patients have pain in their muscles because muscles serve as a means of defense and attack, Dr Weiss explained Internal tension is relieved by muscular action, but when there is no action the patient feels that her muscles are hurting and she cannot use them

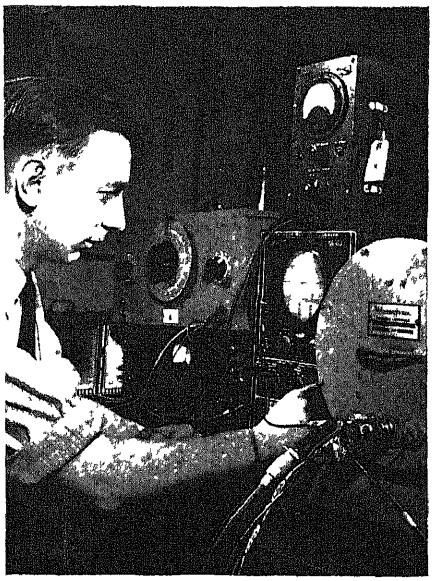
Their lack of energy is sometimes wrongly put to lack of vitamins Actually they are lacking not vitamins but emotional satisfaction in their lives, Dr Weiss said Instead of prescribing more rest, the doctor should get them active and teach them to carry on in spite of the aches and pains

The roots of their trouble usually lie in difficulty with growing up emotionally They are, in a sense, having growing pains, and when these come later in life, they are apt to be more painful than in childhood Instead of braces and supports for their aching backs these patients need inner braces—braces for their emotional development

Some of these patients may have an organic disease such as brucellosis, or undulant fever This germ disease makes a person pepless and gives him muscular aches and pains, too There may be other diseases present along with the emotional trouble Sometimes organic disease breaks down a person's psychological defenses and he regresses unconsciously to a childish emotional state. The form this takes is determined by his previous personality development

Science News Letter, May 25, 1946

A *nylon plant* is planned for Australia with the help of Canadian technical resources and skilled manpower



BLAST RECORDER—Shown in the Westinghouse Research Laboratories, where equipment for test procedures for "Operation Crossroads" was coordinated, is this maze of intricate instruments that will record for scientists the force of the atomic bomb blasts near Bikini Atoll this summer. Small electrical signals from the target ship will be amplified and fed into a transmitter, which will send out high-frequency radio signals corresponding in intensity to the force of the blasts. High-speed cameras many miles away will make on film a permanent record of the tests.

MEDICINE

'Flu Vaccination Advised

Results of Army experience show that it is very worthwhile. Ratio at one university of vaccinated to unvaccinated was one to nine.

➤ GET YOURSELF vaccinated against influenza next fall, especially if an epidemic seems brewing This, in effect, is the advice, based on Army experience, given by Dr Thomas Francis, Jr , and Dr Jonas E Salk of the University of Michigan School of Public Health, at the meeting of the American College of Physicians

Everyone in the Army was vaccinated against influenza last fall by order of the Surgeon General Groups of vaccinated Army students and unvaccinated students at two universities were studied during last winter's outbreak of the disease

At one university, the Michigan doctors reported, the ratio of influenza cases among vaccinated and unvaccinated was one to nine The rate of hospital admissions for respiratory disease, which might mean everything from bad colds to pneumonia and would include influenza, was 1.1% among 800 vaccinated and 9.9% among unvaccinated

These figures, the doctors stated, reflect the general trend in the vaccinated Army as compared with other similar unvaccinated groups in the population

Earlier studies with the vaccine showed that it may give protection for as long as a year

"The problem for the future," the doctors pointed out, "is to devise means for enhancing and prolonging individual protection and to extend knowledge into the field for establishing the minimum requirements to prevent the epidemic phenomenon"

Vaccination of part of the population gives some protection even to the unvaccinated, they explained This is because it reduces by the number protected by vaccination the number who might otherwise get the disease and pass it on When scientists get some knowledge of how much the spread of influenza into epidemics can be checked by vaccination of part of the population, and by how large a proportion, it may not be necessary to take steps to protect every individual by vaccination

"Until such time," they cautiously advised, "it would appear advisable to suggest that the protection of the individual should be practiced."

Some reactions to the influenza vaccinations occurred They were about the same as those following shots against typhoid fever. More serious reactions may occur in persons allergic to egg protein, since the influenza is made from virus grown on chick embryos.

Science News Letter, May 25, 1946

MEDICINE

Beef for Streptomycin

➤ THE MEAT SHORTAGE may be to blame in part for the short supply of streptomycin In production of the drug, which is penicillin's potent ally in fighting germ diseases, a need for beef pancreas was cited specifically by Dr. Chester S. Keefer of Boston at the American College of Physicians meeting in Philadelphia.

Trypsin enzyme from beef pancreas is needed for the preparation of streptomycin from the crude brew of soil organisms which produce the drug. Beef pancreas, however, is also needed to produce insulin for diabetes At present insulin has also a high priority on the pancreas supply because there is not any too much insulin, without which thousands of diabetics would die

Streptomycin production is much more difficult than penicillin production and the yield per quantity of fluid is smaller; about ten times as much streptomycin by weight as penicillin is required to treat a patient From one-thirtieth to one-eighth of an ounce of streptomycin is required daily in the average case It must be given by injection every three to four hours This also contributes to the difficulty in getting enough of the drug to treat all the patients who want it

Dr Keefer's committee of the National Research Council which allocates streptomycin for civilian use is now getting about one-fourth the total production, the rest going to the Army, Navy Public Health Service, and Veterans Administration. This supply is about enough to treat 1,000 patients per month

Present cost is $15 for a thirtieth of an ounce but this is being paid by a grant from the manufacturers Within the next month or six weeks CPA hopes to be able to allow commercial distribution of streptomycin for treatment of tularemia, influenzal meningitis and those urinary tract infections for which neither penicillin nor sulfa drugs are effective

Science News Letter, May 25, 1946

PUBLIC HEALTH

Safer Automobiles for Fewer Highway Accidents

➤ AS PRESIDENT TRUMAN keynoted his Highway Safety Conference with a warning against murder on the nation's roads, the Committee on Engineering opened its discussions with a preliminary report offering some ideas for safer automobiles.

The report urges modern, sealed-beam headlights, declaring, "about one-third of the vehicles met on the road have old-style headlighting in various stages of depreciation." Polarized headlights are called a "possibility" with more experimental work needed

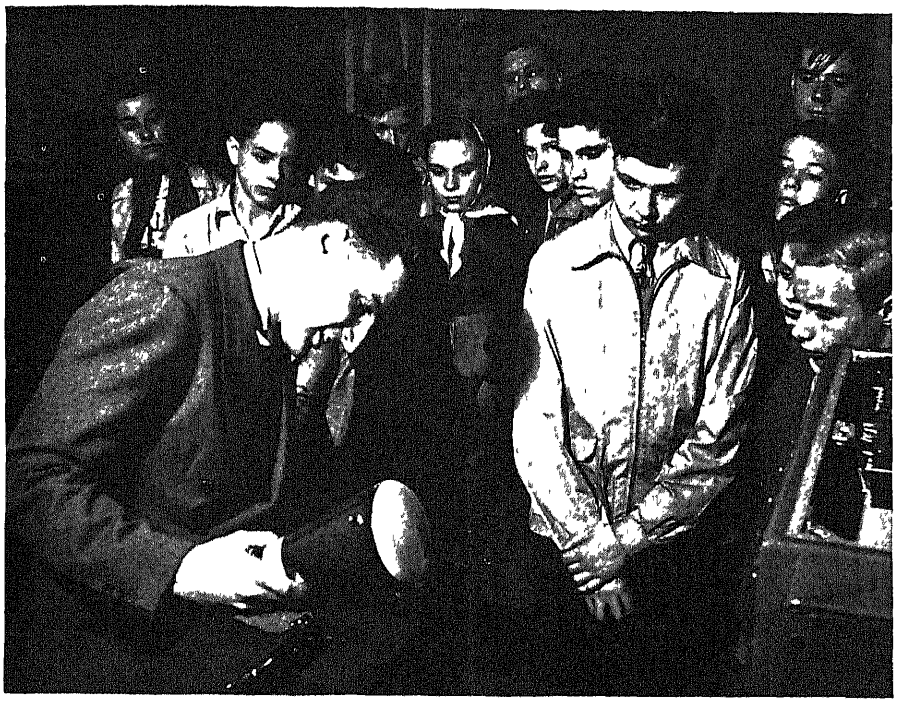
Direction signal lights on cars have not reached the stage of standard equipment, the report says, adding that modification of some highway laws will be necessary if they do. While there is no substitute for good driving in turning, the engineers report that signal lights seem to be a desirable safety measure

Wartime synthetic rubber may continue in the tubes of your tires, because tubes made of butyl are safer than natural rubber Tubes made of this synthetic maintain inflation pressures over much longer periods than do tubes made of the natural rubber product

The report found shortcomings in some safety proposals Governors on passenger automobiles, the engineers say, would be hazardous because they would prevent the driver from speeding out of trouble in some cases.

Even safety glass, praised for its shatterproof qualities, must be modified to save lives Present safety glass in cars is so strong that fractured skulls are reported instead of cuts from flying glass

Science News Letter, May 25, 1946



FIRST INSPECTION—The Naval Research Laboratory is opened to the public for the first time since the war, and the first visitors were a group of junior high school students. T. H. Chambers, radio engineer of Naval Research Laboratory, Office of Research and Inventions, explains the cathode tube and the Navy's radar equipment to Alice Deal Junior High School students, Washington, D. C.

BIOLOGY

Busy Molecules

Genes duplicate selves while managing other molecules. Other protein molecules participate in the business of life, but only genes have this double activity.

➤ GENES are exceedingly busy little things—protein molecules that have the power to create other genes in their own likeness and at the same time manage the manifold businesses of the living body, Prof. George W Beadle of Stanford University told scientists gathered at the George Westinghouse Centennial Forum in Pittsburgh

Although protein molecules of many other kinds participate in the business of life, none but genes are known to have this double activity, he said. Nearest thing in both size and activity, are the virus particles that cause many diseases; but although these have the power of self-duplication they do not direct activities other than their own—they are parasites, and can only destroy

Prof Beadle conjectured that life may have originated on this planet by some "independent" genes being assembled out of non-living atoms, and in the long course of ages becoming associated with other genes, eventually building up something that could properly be called an organism.

Infinitely Small Beings

Scientists are learning more about the nature of life by prying into the almost infinitesimal cracks that exist between molecules and atoms in living substances Dr Linus Pauling of the California Institute of Technology told the Forum. These go far below the length of the shortest light waves, so that visual means are of no use for examination or measurement; the researcher's tools for this work are beams of X-rays and electron streams

To give a more vivid picture of the task, he bade his hearers imagine a giant 250,000,000 times the size of a man trying to examine New York City The whole earth, to such a being, would be about the size of a billiard ball, New York would be a barely visible speck a hundredth of an inch in diameter

With a microscope the interplanetary giant would be able to make out such features as the rivers and Central Park, and some of the massed grouping of skyscrapers But to pick out individual skyscrapers and perhaps to learn something about their larger rooms an electron microscope would be necessary On this scale, automobiles would be barely visible spherical specks, and people could not be seen at all

Friends and Enemies

Microbes can be friends to man as well as enemies, declared Prof Selman A Waksman of Rutgers University, discoverer of streptomycin We became unpleasantly acquainted with a number of the unfriendly kinds during the recent war, especially in the steaming tropics of the Southwest Pacific, he said These included not only disease germs but also some especially pernicious fungi that spoiled food, clothing and equipment.

With friendly microbes we have been longer acquainted, he pointed out Ancient man made use of them long before anyone ever saw them or knew what they were· yeasts raised his bread and made his beer and wine, root-nodule bacteria helped clover to raise the fertility of his fields, bacteria and molds gave flavor to his cheese and ripened his butter In our time, soil-inhabiting bacteria and molds have given man his best weapons against the unfriendly microbes that try to kill him.

Science News Letter, May 25, 1946

Ladino Clover is a giant form of common white clover, and makes good pasture.

A *bird's feather,* for its size and weight, is said to be the strongest structure in nature.

Lacrosse, now a popular college game, was played by American Indians long before white people came to the present United States, Indian fields were from one to five miles long and often 100 men played on a single team.

PHYSICS

Don't Worry About Rockets from Overseas

➤ IF YOU have been lying awake nights worrying about rockets attacking us from some other continent, relax

The maximum practical range for rockets of the V-2 type, improved with wings for gliding, is about 500 miles, not enough to offer much of a threat from any other continent

Dr J C Hunsaker, chairman of the National Advisory Committee for Aeronautics and Massachusetts Institute of Technology professor, in a scientific communication to the National Academy of Sciences, gave this engineer's view of the future possibilities of an improved V-2 type rocket

Calling the German V-2 weapon "the highest state of the art of rocket design," he explained that its starting weight was nearly 14 tons of which 9 tons was fuel, yet its true pay load was only one ton of explosive It had an artillery type trajectory of about 200 miles. A ratio of starting weight to empty weight of much more than three is unlikely in an improved rocket, in Dr. Hunsaker's opinion, and the present range of 200 miles is near the maximum for the type

By the addition of wings, Dr Hunsaker explained, the range could be stretched several hundred miles This would change the artillery type of path through the air into a glide under the pull of gravity But this would not be enough "to provide missiles to be projected on an intercontinental adventure"

Science News Letter, May 25, 1946

PHYSICS

Quarter of a Million Revolutions per Second

➤ SPINNING at speeds approaching a quarter of a million revolutions per second, little steel balls in the physics laboratories of the University of Virginia are the fastest-turning things in the world. Use of these whirling spheres as super-centrifuges to study the behavior of steel and other materials under great strain was described before the meeting of the Virginia Academy of Science in a joint report prepared by J L Young III, J W Moore and Prof J W. Beams

At a measured speed of 211,000 revolutions a second, the "equator" of one of these one-sixteenth-inch steel spheres reaches a velocity of a little more than 3,300 feet a second, which is approximately three times the speed of sound, and 600 feet a second faster than a bullet as it leaves the muzzle of a Garand rifle The centrifugal force generated is 1,400,000 times greater than the pull of gravity at the earth's surface This far exceeds the calculated gravitational pull at the surface of the sun, which is only about 27 times that of the earth

Nothing touches the sphere as it spins It is held up by a carefully adjusted magnetic field, like the legendary coffin of Mohammed, and kept going by an electric drive To eliminate air friction, which might cause it to burn itself out like a stationary shooting star, it is operated only in a vacuum

Science News Letter, May 25, 1946

ENGINEERING

Latin American Engineers Study Road Building

➤ HIGHWAY OFFICIALS of 16 Latin-American countries started from Washington, D C, last week to visit modern highways in Midwestern states, roads under construction and plants making road materials. They have come to the United States to gather technical information to apply to their local highway building programs

These engineers, together with others from China, India and Egypt, have just completed a five-week Inter-American highway course in the National Academy of Sciences building The course was given by outstanding engineers from federal and state highway departments As a part of the instruction visits were made to nearby Maryland and Virginia highways

The western trip, which will be by special bus, will be over the famed Pennsylvania Turnpike to Pittsburgh, and then over other noted roads to Chicago, where the delegates will attend a Road Show and Highway Congress of the American Road Builders' Association.

The inspection trip will be followed by several months of actual employment in a variety of engineering, manufacturing and construction jobs, after which the delegates will return to Washington for a round-up course

Latin-American countries represented are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, Ecuador, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela

Science News Letter, May 25, 1946

IN SCIENCE

BIOLOGY

Skipper Caterpillar Solves Housing Problem

See Front Cover

➤ THE LARVA of the silver-spotted skipper butterfly handles its own housing problem by using several leaves, as shown in the photograph by George A Smith on the front cover of this SCIENCE NEWS LETTER, for a comfortable dwelling place In building a house, the larva fastens several leaves together with strands of silk so that it will have a retreat when resting or molting It generally remains in its house during the day, and comes out to feed during the night. As the caterpillar molts and grows bigger it leaves its old home, and constructs a new and larger one. This is shown by the fact that many of these peculiar dwellings, among locust leaves where the caterpillar usually lives, are empty when examined Whether or not the house is occupied, it is always as scrupulously clean as that of a Dutch housewife

Science News Letter, May 25, 1946

CHEMISTRY

Cellulose Acetate Made By Unusual Process

➤ CELLULOSE ACETATE, widely used in transparent and high-strength plastics, was produced during the war by an unusual process in Germany which required less acetic acid than normally used, it is now revealed

The process involves treating beechwood pulp with acetic acid in the presence of a large excess of zinc chloride The mixture used for acetylation consists of 950 pounds of solid zinc chloride, dissolved in 1780 pounds of 100% acetic anhydride and 1000 pounds of glacial acetic acid No sulfuric acid, commonly used as a catalyst, is required

British and American scientists learned of the new process while visiting Germany since the war in search for technical developments of value to the two governments The U S. Department of Commerce released a report giving details of this unusual method

Science News Letter, May 25, 1946

E FIELDS

PSYCHOLOGY

Human Volunteers for Bikini Test Declined

➤ A CURIOUS medley of motives stimulated the 40 persons who have offered themselves for exposure to the atom bomb's blast on the target ships at Bikini atoll Their offers, though not their names, were disclosed at Vice Adm W H P Blandy's final press conference before he took off for the Crossroads Operation site

One individual wanted to be paid $10,000—presumably in advance Several were obviously crackpots, and some were daredevils seeking publicity or a thrill A few, including one old man who didn't expect to live much longer and one convict who lost his chance to fight in World War II, declared their anxiety to be of service to their country.

All 40 received courteous answers—declining their offers

Even the pigs and goats will not be exposed to the full fury of the blast They will be on vessels outside the center of the target area, or behind the thick steel of turrets and conning towers

"We can't learn anything from dead animals," Adm Blandy commented "We don't want dead animals, we want sick animals" And he added that medical officers will try to bring the radiation-sick specimens back to health

The last human beings on the target ships, there to place instruments, etc, will be removed three hours before the bomb is dropped

Science News Letter, May 25, 1946

GENERAL SCIENCE-EDUCATION

Virginia Conducts First Statewide Talent Search

➤ AT A BANQUET, held in candlelight due to emergency power restrictions, the Virginia Academy of Science turned the spotlight on the 15 high school seniors, winners in the first statewide Science Talent Search

Top honors of $100 each went to Barbara Ann Macy, Thomas Jefferson high school, Richmond, and Lewis Franklin Garber, Highland Springs high school, Sandstone Miss Macy plans to be a chemist; Mr. Garber a physicist Both were named for honorable mention in the national Science Talent Search earlier this year

Fifty-dollar bonds were awarded to the rest of the 15 contestants

Offers of scholarships from colleges, universities and technical schools in and out of the state to the 15 teen-age scientists now total $30,000

The Virginia Science Talent Search has been run concurrently in cooperation with the National Science Talent Search, administered by Science Clubs of America, a Science Service activity

Science News Letter, May 25, 1946

PHOTOGRAPHY-CHEMISTRY

Metallic Silver Recovered Cheaply with Wood Waste

➤ SILVER CAN be recovered cheaply and quickly from used photographic hypo through the use of lignin, waste product from wood When lignin treated with alkali is poured into the hypo, silver in the photographic solution quickly settles to the bottom along with the lignin The liquid hypo is poured off, the lignin burned, and metallic silver is left

This process, far more convenient than any used at present in salvaging silver from used photographic solutions, will be a boon to companies that develop films on a large scale It was devised by Dr Eduard Farber and Dr M Sciascia of the Timber Engineering Company, where research into lignin and other chemical phases of wood is conducted

Only a small amount of lignin need be used, an amount equal to the silver to be saved being sufficient—a fraction of the quantity of other solutions needed

All of the silver will drop to the bottom of the solution within an hour when it is heated

Lignin left from making wood sugar is good for recovering silver from the hypo. Treated plain sawdust and even mill waste may also be employed The solution can be dehydrated for shipping

For quickest results, the used hypo should be heated before the wood solution is added Silver will begin to settle out a few minutes after the mixture has been made sufficiently alkaline

By burning the organic wood material in the precipitate, silver is obtained in the form of a metallic residue This can be purified by washing with dilute mineral, acids which do not attack the silver, or by any other method usually employed for refining metal

Science News Letter, May 25, 1946

MEDICINE

New Memorial Fund for Medical Research

➤ GRIEF OVER the loss of friends and relatives will provide the means for scientific attacks on the diseases from which they died, if a new memorial plan recently proposed captures the imagination of the American public

A group of medical men, scientists and laymen have organized a medical memorial fund to receive memorial gifts that would be applied to some of the neglected fields of medical research A memorial certificate would be sent by the national organization to a relative of the person in whose memory the gift is made

Heart and artery diseases, the nation's greatest causes of death, had only 17 cents per death in charitable funds given for research upon these diseases, Dr Harlow Shapley, Harvard astronomer and chairman of the trustees of the new memorial, said in announcing the new fund

Dr Henry S Simms of Columbia's College of Physicians and Surgeons, is president, while Dr J Murray Steele is medical director and head of the group that will allot funds for research

Science News Letter, May 25, 1946

ACOUSTICS

Hearing in Noisy Places Aided by "Ear Wardens"

➤ YOU CAN HEAR better in noisy surroundings if you wear ear plugs. That was proved on fighting ships during the war, and may find important uses in peacetime industry

Experiments on wartime plugs, called "ear wardens," were reported to the Acoustical Society of America by K D. Kryter of the Psycho-Acoustic laboratory, Harvard University

Using the "ear wardens," you can understand announcements over a public address system better if the surrounding noise is any greater than normal conversation or 75 decibels, the scientist declared

He said that in many situations where high noise levels are present, ear plugs can be used to understand speech more clearly, to prevent hearing losses and to reduce annoyance and fatigue commonly attributed to noise

During the war, the Navy used "ear wardens" to help make orders more clearly understood in the noise of battle

Science News Letter, May 25, 1946

ASTRONOMY

Venus Shines in West

It is most brilliant object in June evening skies. Summer starts on June 21, when the Northern Hemisphere begins to receive its greatest radiation from the sun.

By JAMES STOKLEY

➤ LOW in the west, as the evening skies darken, is the brightest star or planet of June This is Venus, which is gradually swinging around to the east of the sun so that it remains longer and longer in view after the sun has gone down It is in the constellation of Gemini, the twins, but these stars are much fainter, and not as easy to locate. The two principal ones in the constellation—Castor and Pollux —are both shown on the accompanying maps These depict the heavens at 10 00 p m, your own kind of standard time, on June 1 and an hour earlier at the middle of the month Where daylight saving time is observed, this will, of course, be at 11·00 p m on the first and 10 00 p m on the 15th

On the astronomer's scale, Venus is of magnitude minus 3 4 Close to it is another planet, Saturn, which is much fainter, of magnitude 0 4. On the map, Saturn is shown below Venus as it will be after the middle of June Earlier, Venus will be lower, and on June 12 will pass her fainter and more distant brother.

Mars and Jupiter

Two other planets are also indicated, in somewhat better positions for viewing Directly west, in the constellation of Leo, the lion, is the red planet Mars. Since January 10, Mars has been receding from the earth and continually dimming Then its magnitude was minus 1.2, but it was at the comparatively short distance of 59,400,000 miles Now it has gone out to 169,440,000 miles, and has dropped to magnitude 1 6 By December it will be still more distant, at 225,580,000 miles, but it will be nearly in line with the sun and not visible Mars in June is close to the star Regulus On June 18 they will be nearest, with Mars less than a degree (twice the apparent diameter of the full moon) to the north

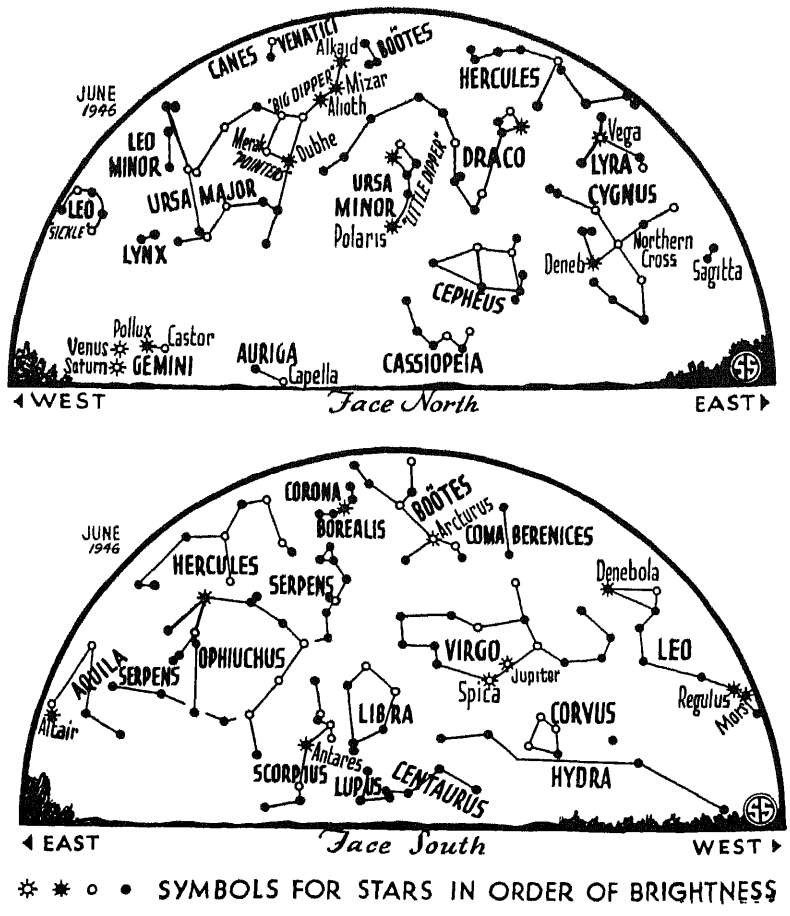
Our fourth June planet is Jupiter. With magnitude minus 1 8, it is more brilliant than any except Venus The constellation of Virgo is its location, and it is close to the star Spica, which it exceeds in brightness about 16 times.

Mercury, the only other planet that ever becomes bright enough to be seen without a telescope, will hardly be visible at all in June By the 30th, however, it will be about 15 degrees above the horizon at sunset, just north of the west point Then, and for the next few days, it will be possible to get a glimpse of it if you have a clear view to the west.

Some of the stars of June evenings have been mentioned The brightest is Vega, in Lyra, the lyre, which is high in the east Below it is Cygnus, the swan. Six of the stars in this group form the "northern cross" with Deneb at the northern end To the right of Cygnus is Aquila, the eagle, where Altair is the brightest star. High in the south, above the eastern end of Virgo, is Bootes, the bear driver, containing first magnitude Arcturus Just to the left of this figure is a semicircular group called Corona Borealis, the northern crown It was in this constellation that a star called T Coronae Borealis unexpectedly flashed out to naked eye visibility a few months ago, but now it has dimmed again and can only be seen with a telescope. (*See* SNL, Feb 16)

Low in the south is Scorpio, the scorpion, in which ruddy Antares shines Only part of this constellation is indicated, but later in the evening it is entirely in view Extending eastward from Antares is a hook-shaped row of stars which forms the scorpion's tail

On June 21, at 7.45 p m. EST, occurs the summer solstice. This is the moment when the sun, which has been moving northward since last December, reaches its farthest north. In the northern hemisphere this is the beginning of summer,



but in countries south of the Tropic of Capricorn, it marks the beginning of winter

This year there are six eclipses, of which the third and four come in June, but unfortunately, neither will be visible in the United States On June 14 the moon will enter the earth's shadow, producing a total lunar eclipse This will be seen throughout most of the Eastern Hemisphere, Antarctica, Australia and New Zealand, and the eastern tip of South America

Two weeks after that, when the moon has moved half way around the sky and is in the same direction as the sun, it will come partly between the sun and the earth, producing a partial solar eclipse At a point in Greenland, near the Arctic Circle, this will be at maximum, but even there less than a fifth of the sun's diameter will be hidden In northern Canada it will be visible also, during the night, for this is the land of the midnight sun

At this time of year, when the sun is farthest north, we in the Northern Hemisphere receive the greatest radiation from it, and we begin to be impressed, unpleasantly perhaps, on a hot summer day, with the energy that it sends us Without it however, the earth could be a dead, cold world Upon this radiation of energy, most of which is broadcast to space so that only a very minute fraction reaches our planet, we are completely dependent for our very existence

Old Atomic Energy

No matter whether we burn wood, coal or oil, or whether we use power from falling water, or from the wind, all of our energy ultimately comes from the sun And this energy has an atomic source Thus atomic energy, which has become such a common topic of discussion, is nothing new Indeed, the earth has never used anything else but atomic energy! However, we have had to use it very indirectly—now we are beginning to learn how to take it directly from the sources at the hearts of atoms

Hans A Bethe, Swiss-born physicist of Cornell University, is the scientist who finally gave a solution to the old problem of how the sun keeps fueled Ordinary burning is not nearly adequate, a fact that was long ago recognized Other theories have been propounded but they, too, were found wanting Though Dr. Bethe's suggestion is still only a theory, it seems to rest on very solid ground, and is now generally accepted by astronomers

In the process thus envisaged, hydrogen is the fuel This is the lightest and simplest of the elements Its atom consists of a proton, a particle with a positive electrical charge, around which revolves a single electron, carrying a charge of negative electricity In the sun, and in other stars, four nuclei of hydrogen atoms are eventually combined to form a single atomic nucleus, which is that of the gas helium The helium nucleus, however, is not quite four times as massive as one of hydrogen Some of the mass is lost in the process, and this is given off as energy.

Six Steps in Process

The process has six steps It is a cyclic one, but usually it is considered as starting with an atom of ordinary carbon, with which an atom of hydrogen unites, resulting in the emission of some energy and leaving an atom of a short-lived variety of nitrogen, which quickly changes to another form of carbon Then the second hydrogen atom comes along, the carbon is transmuted to ordinary nitrogen, the kind which makes up most of our atmosphere Energy comes off again at this transformation. Along comes another hydrogen, and the nitrogen is changed to a rare kind of oxygen. This, too, lasts briefly, and soon changes to still another kind of nitrogen. Then the fourth hydrogen atom arrives, and the nitrogen changes to helium and ordinary carbon The latter is what we started with, so the cycle is ready to start over again

The times required, on the average, for these changes, vary widely. The fourth step from nitrogen to oxygen requires 4,000,000 years for one atom but there is so much material in the sun that it is occurring all the time The next step is the shortest, and an atom of the oxygen produced will probably change to nitrogen in about two minutes

Though this process is so important, it is unlikely that we will ever be able to reproduce it on earth, for it takes place only under the conditions of temperature—millions of degrees—and the enormous pressures that prevail inside the stars Atomic energy on earth will probably long continue to be dependent on the process of fission of uranium, as used in the atomic bomb, or one that is comparable to it.

Celestial Time Table for June

June	EST	
1	6 36 p m	Moon passes Venus
2	1 21 p m	Moon passes Saturn
4	1 35 p m	Moon passes Mars
6	11 06 a m	Moon in first quarter
8	10 22 p m	Moon passes Jupiter
12	8 00 a m	Venus passes Saturn
	5 00 p m	Moon farthest, distance 252,300 miles
14	1 42 p m	Full moon, total eclipse of moon, visible in Eastern Hemisphere
21	7 45 p m	Sun farthest north, summer commences
22	8 12 a m	Moon in last quarter
23	8 00 p m	Mercury passes Saturn
27	7 00 p m	Moon nearest, distance 223,400 miles
28	11 06 p m	New moon, partial eclipse of sun, visible in Arctic regions
30	4 55 a m	Moon passes Saturn
	6 17 p m	Moon passes Mercury

Subtract one hour for CST, two hours for MST, and three for PST Add one hour for the corresponding Daylight Saving Time

Science News Letter, May 25 1946

NUTRITION

Letting Milk Stand May Reduce Value

➤ LETTING milk stand in bottles on the doorstep may destroy some of its nutritional value Using ultraviolet light to destroy germs in it may be even worse. Experiments reported by H D Kay of the National Institute for Research in Dairying at Shinfield, Reading, England, indicate that exposure to light destroys a fat-digesting enzyme present in milk as it is drawn from the cow Even a few minutes of such exposure will cause a partial breakdown of this compound; a half-hour's exposure produces 80% destruction

Science News Letter, May 25, 1946



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Do You Know?

Birds eat at least half their own weight in food daily

Wild *bison* could smell water five miles away, it is said.

Only about one-third of the *wood* in a tree is now converted into usable products

Jimson weed is a fence-corner relative of the potato and the tomato and several other useful crop plants of the family Solanaceae

A bag of *silica gel* stored with the household crackers and breakfast cereals will keep them crisp and edible in humid weather

More than 15,000 groups of *sunspots* have been recorded since 1873, 25 of these were conspicuous when viewed by the naked eye through dark glasses

Some *hermit crabs* live in water, some along the shore, both kinds vary in size from those with shells hardly larger than the head of a pin to others of grapefruit size

The common *cowpea,* also known as the blackeye pea or the blackeye bean, provides popular human food in its seed and valuable feed for cattle in the plant itself, when plowed under the plant enriches the soil

YOUR
HAIR
AND ITS CARE
By Oscar L Levin, M D.
and Howard T Behrman, M.D.

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PUBLIC HEALTH

Polio in Florida

This state has almost four times as many cases this year as in 1945. But only 56 cases of the disease were reported for the entire nation the week of May 11.

➤ TEXANS seem to have gotten excited over an increase in infantile paralysis cases, but Florida is the spot national health authorities are more inclined to view with concern over signs of an impending outbreak of the disease

Latest reports to the U S Public Health Service show that for the week ending May 11, Texas had 16 cases of polio while Florida had 17 Since the first of the year, Texas has had 63 cases compared with Florida's 98 That gives Florida almost four times as many cases this year as in 1945, while the Texas figure for the year so far is only nine cases more than the previous year Texas, like California, has for the past several years had what health authorities call "a good deal of residual polio," meaning that a good many cases occur long after the polio season has elsewhere closed in the fall and before it starts up in the summer

Clean-up campaigns such as have been started in Texas are not likely to stop an infantile paralysis epidemic, if one is coming, though such campaigns are good in themselves Flies have been shown capable of carrying the infantile paralysis virus but there is no valid evidence that they play a part in spreading the disease or causing epidemics The same is true of unsanitary conditions Infantile paralysis virus has been found in sewage and in bowel discharges of patients, but there is no valid evidence that it spreads, as typhoid fever does, through sewage-contaminated water

Only 56 cases of infantile paralysis were reported for the entire nation for the week of May 11 This includes the Texas and Florida cases

The only real hope of preventing infantile paralysis lies in the development of a protective vaccine, Dr H E Van Riper, assistant medical director of the National Foundation for Infantile Paralysis, declared in discussing the situation.

No such vaccine exists at present although scientists are trying to develop one

Hope of protecting children from polio by injections of material from blood as they can now be protected against measles by such material is very slim Such antipolio substances have been found in blood, Dr Joseph Stokes, Jr, of Philadelphia reported at the meeting of the American College of Physicians in that city

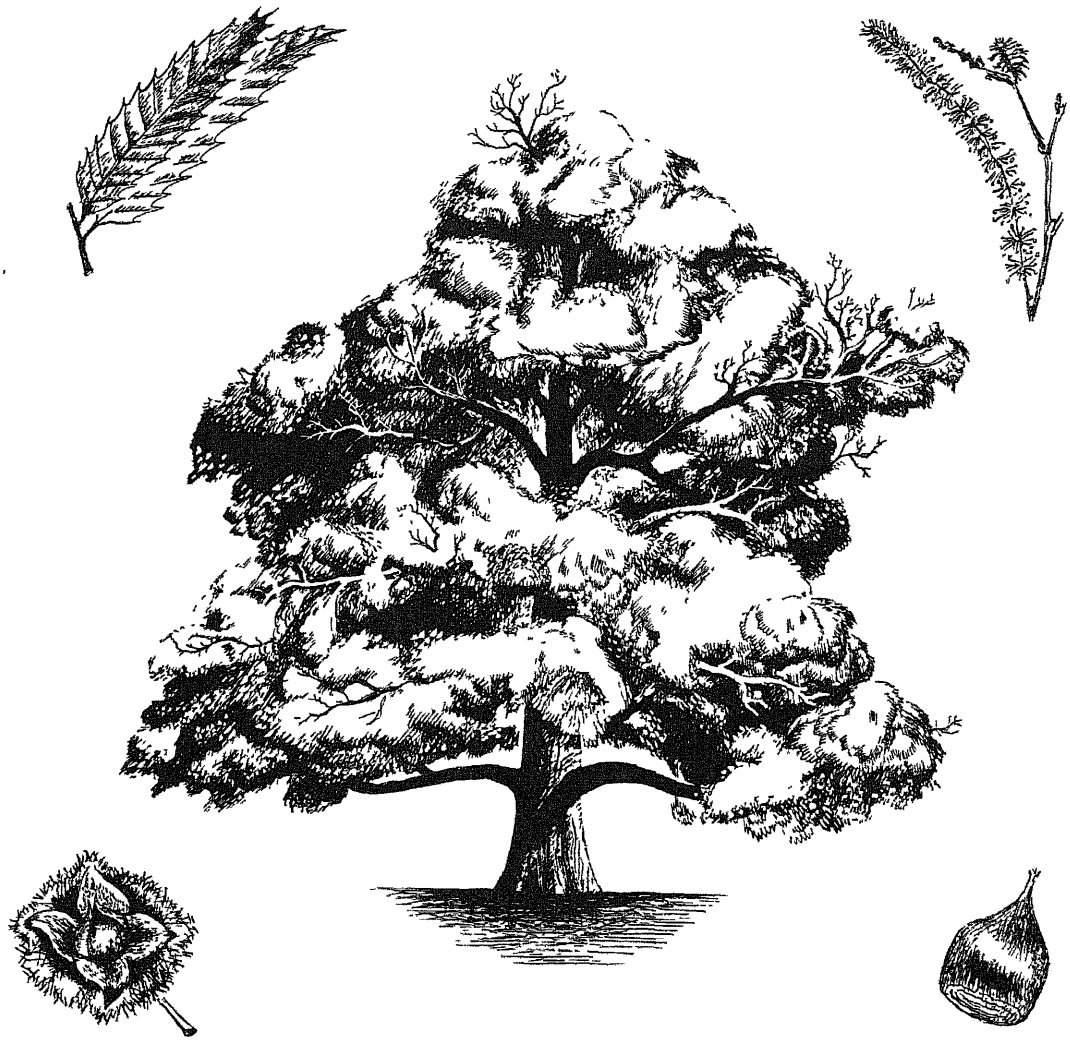
Difficulties in using it, even for a trial, are many, he pointed out It would take enormous quantities of blood, since it might be necessary to give children repeated injections throughout the summer, and the amount of the material in a pint of blood is very small There are different strains of polio virus, just as there are of influenza virus, and even large pools of blood plasma might not contain the strains needed for protection in a given epidemic Finally, the demands of frantic parents to have their children included if they knew trials of such a procedure were under way might make it impossible for the trials to continue or to give any real information on the value of the procedure

Science News Letter, May 25, 1946

Drilling for *oil* will soon be resumed in northern Cebu in the Philippines, prewar uncompleted drilling gave encouraging indications of oil

Over 20,000 acres of waxy *endosperm corn* is being grown in Iowa this year, it is a very new crop for America, raised to replace imports of tapioca and other starches from the East Indies

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Gone is the "spreading chestnut tree"

Millions who recall Longfellow's immortal poem may be surprised to learn that the chestnut tree is nearly extinct. Entire forests have been killed by *Endothia parasitica,* a blighting fungus causing serious bark disease It is a devastation that placed the leather industry in a critical position—for centuries, the fabled chestnut tree had been the chief source of leather tanning agents

However, as is often the case when nature's replenishing power becomes inadequate, chemistry developed a replacement for the extract of the chestnut tree It is Exan*—a Monsanto synthetic vegetable tanning chemical. Not only is a constant source of supply now assured, but Exan has already proved far superior to the natural product formerly used.

The story of Exan is a story of chemical synthesis paralleled by many Monsanto product developments Monsanto plastics, for instance, are synthetics that offer glamorous and practical possibilities bounded only by the imagination of industry. Vanillin is another synthetic—a flavoring agent developed long ago by Monsanto as a defense against the caprices of nature in supplying vanilla beans. The wide field of rubber products is also among the many that have benefited richly through Monsanto synthetics

*Reg U S Pat Off

The history of Monsanto's progress in service is replete with examples such as these. Too numerous to recount here, they emphasize again Monsanto's important role—Serving Industry . . . Which Serves Mankind

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• Books of the Week •

ADVANCING FRONTS IN CHEMISTRY Vol II, Chemotherapy—Wendell H Powers, ed—*Reinhold,* 156 p, tables and illus, $3 25 A series of lectures given at the Symposium on Chemotherapy held at Wayne University Each contributor has aimed at a presentation of his topic which will be easily understood by the lay reader, without depreciating its value to the research worker who is familiar with the field

AMERICAN FOUNDATIONS FOR SOCIAL WELFARE—Shelby M Harrison and F Emerson Andrews—*Russell Sage Foundation,* 249 p, tables, $2 Description of the organization and finances, history, activities, and possible development of social welfare foundations in America, together with a descriptive directory of 505 foundations

BIBLIOGRAPHY AND INDEX OF GEOLOGY EXCLUSIVE OF NORTH AMERICA Volume 10, 1943-44—John M Nickles, Marie Siegrist, and Eleanor Tatge—*Geological Society of America,* 203 p, $1 50

A BIBLIOGRAPHY OF INFANTILE PARALYSIS 1789-1944—Morris Fishbein, M D, ed, Ludvig Hektoen, M D and Ella M Salmonsen, compilers—*Lippincott,* 672 p, $15 A bibliography, with selected abstracts and annotations, of the periodical literature covering the clinical and investigative work on infantile paralysis since its description by Underwood in 1789 Prepared under direction of The National Foundation for Infantile Paralysis, Inc

THE BIOLOGY OF SCHIZOPHRENIA—Roy G Hoskins, M D—*Norton,* 191 p, $2 75 Schizophrenia considered from the point of view of the biologist and discussed as a manifestation of disordered biology

A BUSINESS OF YOUR OWN The Reader's Digest Manual of Ideas for Small Businesses—*Reader's Digest Assn, Inc,* 128 p, paper, 25 cents Selected entries submitted to The Reader's Digest Contest for ideas for unusual small businesses which might be started with comparatively little capital by returned veterans, or by other men and women who are ambitious to establish their own enterprises

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THE COMMON SENSE OF THE EXACT SCIENCES—William Kingdon Clifford—*Knopf,* 249 p, diagrs, $4, new ed An explanation of scientific and mathematical thought for the uninitiated A book first published in 1885, newly edited with a biographical introduction by James R Newman and a preface by Bertrand Russell

HIGH VACUUM TECHNIQUE Theory, Practice, Industrial Applications and Properties of Materials—J Yarwood—*Wiley,* 140 p, tables and diagrs, $2 75, 2nd ed A revised edition containing new sections on construction of vacuum systems, extra methods of measuring low pressures, and pumping speed

A HISTORY OF MEDICINE—Douglas Guthrie, M D—*Lippincott,* 448 p, illus, $6 An outline of the progress of medicine from the days of Imhotep to those of Sir William Osler, answering the need of those who recognize the value of a comprehensive account of the development of medicine as an art

AN INTRODUCTION TO THE STUDY OF ECLIPSING VARIABLES—Zdenek Kopal—*Harvard University Press,* 220 p, diagrs, $4 An account of the present state of the theory of eclipsing binaries and a survey of methods for deciphering the nature of such binary system from an analysis of their light waves

THE JEW IN AMERICAN LIFE—James Waterman Wise—*Messner,* 621 p, illus, paper, $1 25. A vivid presentation in pictures of the Jew as an integral part of America, as farmer, laborer, artist, scientist, doctor, educator, lawyer, soldier, sailor and marine Preface by Eleanor Roosevelt

THE LOST AMERICANS—Frank C Hibben—*Crowell,* 196 p, illus, $2 50 The story of the discovery of the ancient men who lived in America and roamed our western plains during the Ice Age

MODERN ATTITUDES IN PSYCHIATRY The March of Medicine, 1945—*Columbia University Press,* 154 p, $2 A symposium on the use of psychiatry in the practice of medicine The tenth series of the New York Academy of Medicine Lectures to the Laity

MODERN CHEMISTRY Some Sketches of Its Historical Development—A J Berry—*Cambridge University Press,* 240 p, $2 50 A history of chemistry not based on chronology, but having separate chapters devoted to the history of different subjects—electro-chemistry, stereo-chemistry, radioactivity, elements, isotopes, experiments on gases, solutions, chemical change

PAST CONSUMPTION AND FUTURE (1950) REQUIREMENTS OF POTASH SALTS IN AMERICAN AGRICULTURE—J. W Turrentine—*American Potash Institute,* 31 p, tables, paper, free

POSTWAR TAXATION AND ECONOMIC PROGRESS—Harold M Groves—*McGraw,* 432 p, tables, $4 50 A book aimed at providing the reader with a clearer understanding of the long-range factors involved in a planned tax structure; and at development of recommendations for a postwar tax system which will increase production and consumption, conserve resources, and encourage saving and investment

THE PRINCIPLES AND PRACTICE OF TROPICAL MEDICINE—L Everard Napier—*Macmillan,* 917 p, tables and illus, $11 An account of the more important tropical diseases from the point of view of epidemiology, aetiology, pathology, symptomatology, and of such relevant subjects as method of mitigating the effects of tropical climate, nutrition, and anemia in the tropics, and snakes and snake-bite

PSYCHIATRY FOR SOCIAL WORKERS—Lawson G Lowrey, M D—*Columbia Univ Press,* 336 p, $3 50 A book to help the social worker recognize the symptoms which indicate mental disease, to decide when to call for psychiatric diagnosis and treatment, and to determine when he can safely undertake supervision and to understand the limitations of non-professional treatment

THEORY AND PRACTICE OF FILTRATION—George D Dickey and Charles L Bryden—*Reinhold,* 346 p, tables and diagrs, $6 The general concept of filtration as applied to the separation of solids from liquids, and a brief treatment of gas filtration

TUNGSTEN MINERALIZATION IN THE UNITED STATES—Paul F Kerr—*Geological Society of America,* 241 p, maps and illus, $2 50 Geological Society of America, Memoir 15

THE UNITED STATES MERCHANT MARINE AT WAR—War Shipping Administration *Government Printing Office,* 80 p, illus, paper, 30 cents The operations of the War Shipping Administration from its creation on Feb 7, 1942, through the end of hostilities, and up to Dec 31, 1945 An attempt to evaluate the part that our Merchant Marine played in the victory of the United Nations

THE WHITE ROOTS OF PEACE—Paul A W Wallace—*Univ of Pennsylvania Press,* 57 p, $2 The story of the Iroquois Confederacy, a union for peace among the Iroquois Indians Mr Wallace has constructed the story of the Confederacy's founding from three existing versions of the legend, following the poetic language of the Indian originals as closely as possible

THE WONDERWORLD OF SCIENCE Book Nine—Morris Meister, Ralph E Keirstead, and Lois M Shoemaker—*Scribner,* 698 p, illus, $2 20 A science textbook for use in the ninth grade, aimed at giving the beginning of an understanding of synthetic rubber, plastics, sulfa drugs, the foundations of matter, and at relating the developments in science with their social implications

Dates which have not been pollinated are mainly a waste because the unripened seedless fruits are small, hard, and have the taste of a green persimmon.

HISTORY-BOTANY

NATURE RAMBLINGS

by Frank Thone



For One Memorial Day

➤ MOST SUCH holidays are frankly more celebrations of past victories than a taking thought of the heroic dead July 4, our first national holiday, tells its story in its official name Independence Day We celebrate it by reproducing, as peacefully and safely as possible, the noise and fire and smoke of battle. November 11, Armistice Day, usually called for a military parade Presumably we shall presently be celebrating V-E or V-J Day, or both

Only one of these holidays, however, is given primarily to thoughts of those who died for their country That is Memorial Day, celebrated in most of the states on May 30, but still observed in some of the states of the old Confederacy on other dates of their own choosing

It is perhaps natural that this particular holiday should center its attention on the dead rather than on the battles they fought and the victories they won In the South there were the hardship and bitterness of defeat, but in the North there was little rejoicing In a civil war there are no winners all lose

While the different dates of Southern Memorial Days may have resulted in the first instance from unwillingness of the losers to share the victors' holiday, there is another good reason in the ecology of flowers Most of the Memorial Days in the South come earlier than May 30, enabling people to have spring flowers to place on the graves of the Confederate soldiers It is quite natural to have an earlier date for this in, say, Georgia or Texas than in Maine or Minnesota

However, since an increasing proportion of the flowers used on Memorial Day, as well as on all other occasions, are not home grown any longer, the question of having a single agreed-on date naturally suggests itself It is a long time now since Appomatox, in three wars since then descendants of the wearers of both Blue and Gray have fought side by side, and have buried their dead in hasty battlefield graves That which unites North and South today is many fold stronger than the things that once severed them We are one in substance now, only the symbols remain at variance What could better symbolize that unity than walking together to the graves of those who died for their whole country, with flowers in our hands?

Science News Letter, May 25, 1946

GENERAL SCIENCE

Scientists Must Learn Politicians' Characteristics

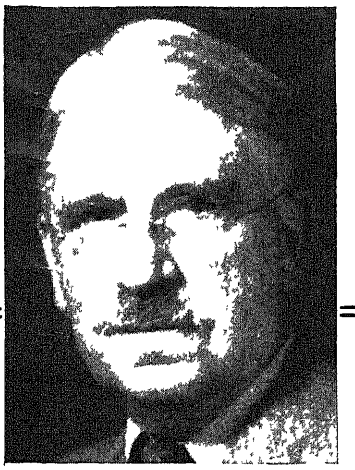
➤ SCIENTISTS, plunged into public affairs through their concern over atomic power control, will need to learn something of the mental adaptability and willingness to compromise that characterize the politician if they intend to continue such participation, Dr Isaiah Bowman, president of the Johns Hopkins University, intimated in an address before the first postwar meeting of the National Academy of Sciences

Such adjustments will not be easy for many thorough-going scientists to make, Dr. Bowman pointed out Scientists are accustomed to reaching clear-cut solutions to their problems, and can prove that their conclusions are right. If they are right, compromise will be likely to seem absurd, even immoral Such logical rigidity, desirable in science, can result only in deadlocks if attempted in government

Science News Letter, May 25, 1946

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Science News Letter, May 25, 1946

⚙ *CIGARETTE HOLDER and lighter in combination has a mouthpiece to hold the cigarette, both are then inserted into a tube with an opening in the opposite end The flint-actuated lighter lies under and against the tube When its ratchet is turned, a spring door opens above the flame, permitting it to reach the cigarette*

Science News Letter, May 25 1946

⚙ *STEERING baby carriage turns to the right or left as pressure is exerted on one end or the other of the handle bars by means of a simple arrangement of pivoted bars connected to the axles With pressure, the rear wheels and axle turn as a unit*

Science News Letter, May 25, 1946

⚙ *KNIFE RACK, a simple contrivance to hang on the kitchen wall, has an unbreakable plexiglas front panel A safe repository built to hold eight knives and sharpening steel, it keeps them out of contact with each other as in the ordinary cutlery drawer, and also out of reach of children*

Science News Letter, May 25, 1946



⚙ *TELEVISION CAMERA, that picks up action scenes and transmits them to distant motion picture screens, is now made in a lightweight portable form particularly suitable for use at football and other games The camera and auxiliary unit shown in the picture use electronic circuits*

Science News Letter, May 25, 1946

⚙ *PARKING PERISCOPE for automobile drivers is a three-channel conduit within the car with one end projecting beyond the rear, and the other curved downward to bring its mirror in front of the driver The direct rear is seen through a lens on the end of the center channel, right and left of the rear are seen through the other channels by means of mirrors*

Science News Letter, May 25, 1946

⚙ *REPEATING flashbulbs for photographers are designed to produce a minimum of 10,000 photographic flashes from a single bulb The first unit, now available, is an AC portable, consisting of a power pack operating the electroflash bulb and an electroflash gun with reflector and flashbulb*

Science News Letter, May 25, 1946

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Question Box

ASTRONOMY

How many eclipses have been predicted for 1946? p 331

How many steps are involved in the process of energy reaching the earth from the sun? p 331

BIOLOGY

What does the silver-spotted skipper butterfly use to solve its housing problem? p 328.

ELECTRONICS

Name the war-developed system for determining the exact location of a lost plane or life raft at sea p 324

HISTORY-BOTANY

What holiday is given primarily to thoughts of those who died for their country? p 335

MEDICINE

What does the new iron lung do to help cure tuberculosis patients? p. 325

What is botulism? p 323

What may be one of the contributing factors to the shortage of streptomycin? p 323

What new remedy for hemophilia is offered? p 323

Why were the forty persons who offered themselves for exposure at the Bikini bomb test refused? p 329

NUTRITION

What happens to milk that is allowed to stand in the bottle on the doorstep? p 331

PHOTOGRAPHY-CHEMISTRY

What material is used to remove metallic silver from photographic hypo? p 329

PUBLIC HEALTH

What are the recommendations of the Committee on Engineering for fewer accidents on the highway? p 326

Which state shows signs of having a polio epidemic this year? p 332

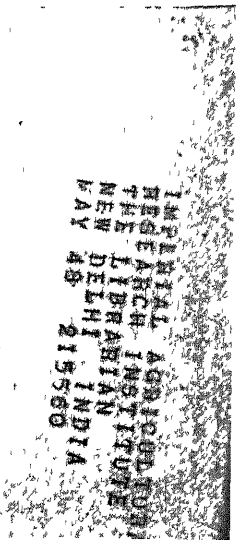
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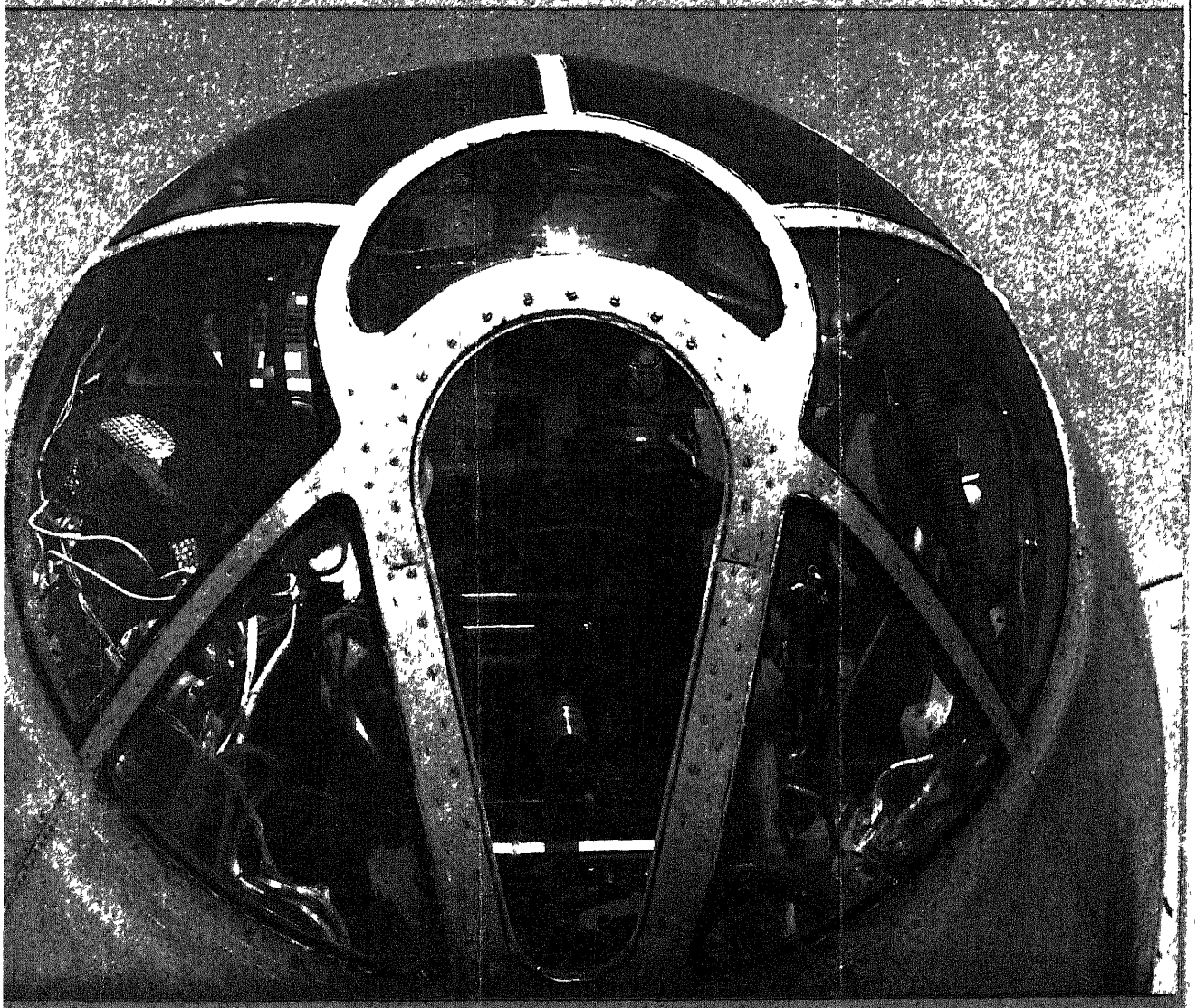
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IENCE NEWS LETTER

Vol. 49, No. 22

IE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 1, 1946



"Shooting" the Bikini Test

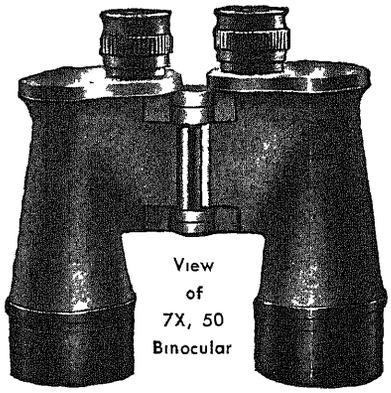
See Page 344

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MEDICINE

More Medical Conquests

New vaccines, antibiotics and drugs active in test tube against fungi, tuberculosis bacilli and diphtheria germs have been presented to the world.

➤ FOUR MORE medical conquests have been presented in their preliminary stages to the world·

1 Vaccine to protect against parrot fever or psittacosis

2 Vaccine to protect against rabbit fever or tularemia

3 A new antibiotic (penicillin-like) drug active in the test tube against fungi, tuberculosis bacilli and diphtheria germs

4 A possible treatment for anthrax infection

These new weapons against disease, not yet ready for front-line use by physicians, were discussed at the first postwar meeting of the Society of American Bacteriologists in Detroit

In addition to these promises for the future, eight preventives or remedies of major disease plagues have been made available in the war years since 1944 when the bacteriologists last met These are disease weapons actually in use or proved and ready for early use They are (1) Vaccine against influenza, (2) Vaccine against rinderpest, dread cattle disease, (3) Vaccine against dengue fever, mosquito-borne malady; (4) Globulin from human blood to protect children against measles, (5) Globulin for protection against infectious hepatitis, popularly known as jaundice from one of its symptoms, (6) Vaccine against typhus fever, (7) Two new remedies for malaria better than quinine, and (8) Streptomycin for one kind of meningitis, urinary tract infections and possibly tularemia, undulant fever and other unconquered diseases.

Food, most pressing problem in this hungry world today, may become more plentiful or more nourishing through studies by the scientists Micro-organisms in the soil help crop plants grow Others reduce the food supply of the world by the spoilage they cause. Still others, some of those that live in the intestinal tract of man and animals, produce some of the vitamins needed for good nutrition New useful knowledge may be expected on these problems and the related one of what food germs themselves need for best growth so that scientists can study them outside the body to devise new ways of killing them, new vaccines to protect against their attack, and reap bigger harvests of antibiotics like penicillin and streptomycin

Possible Tularemia Cure

➤ STREPTOMYCIN may turn out to be a cure for tularemia, or rabbit fever, but hopes for a streptomycin conquest of tuberculosis are dwindling, it appears from reports to the meeting

This anti-germ chemical from organisms that live in the earth saved from 80% to 100% of mice given killing doses of rabbit fever germs even when the germs had a 72-hour start on their deadly work When treatment was delayed as long as 96 hours, the drug still saved almost half the animals

These studies, with their suggestion of a cure for human rabbit fever victims, were made by Lieut (j g) S S Chapman, of the Navy, Capt Lewis L Coriell, of the Army Medical Corps, Sgt. S F. Kowal, pharmacist's mate W Nelson and Miss Cora M Downs at Camp Detrick, Md, where some of our defenses against germ warfare were forged during the war

The ineffectiveness of streptomycin in tuberculosis is due to the fact that the drug only checks the growth of TB germs. To be effective in a disease like tuberculosis, a drug probably must be able to kill the germs, Dr George E Rockwell of Milford, Ohio, explained He found the drug germ-checking but not killing in both test tube and laboratory animals

The treated animals lived longer than untreated ones, but when the streptomycin was stopped, they began to decline and died Examination after death showed they had as extensive tuberculosis involvement as the untreated animals

Further evidence that streptomycin is unlikely to become a remedy for tuberculosis was reported by Dr Guy P. Youmans of Northwestern University Medical School and Dr. William H Feldman of the Mayo Foundation Tuberculosis germs become resistant to streptomycin, it appears Germs from tuberculosis patients who had been getting the drug for a long period were able to grow in the test tube even when large amounts of streptomycin were added Germs from the same patients before treatment were kept from growing in the test tube by one-thousandth the amount of streptomycin that failed to check growth of germs which had become used to the drug in the course of treatment of the patients

Getting the germs off dishes, glasses and eating utensils in restaurants is more a matter of thorough soap and water washing to remove soil than of rinsing in very hot water, Dr Murray P Honwood of Massachusetts Institute of Technology reported

If the dishes are washed really clean, they can be made "sterile" or germ-free by rinse water at 145 to 150 degrees Fahrenheit as well as at 160 to 180 degrees, he found

Drug for Lockjaw

➤ LOCKJAW, which our grandmothers dreaded when someone stepped on a rusty nail or pricked himself with a rusty pin or needle, may soon be conquered by an antibiotic drug of the penicillin class

The cause of this deadly ailment was not the rust on the nail or pin but a poison produced by germs called tetanus bacilli They are found in the soil in many regions and could get on nails or pins lying on the ground War wounds are also likely to become infected with these germs Our troops and many children today are protected against these germs by shots of tetanus toxoid, a substance made from the germ poison and treated so it will not cause harm but will stimulate body defenses against the germs

Now scientists have found that a chemical produced by a micro-organism will neutralize the poison of the tetanus bacillus This discovery was announced by Dr Bruno Puetzer and Dr Thomas C Grubb of the research laboratories of the Vick Chemical Company at the meeting

The chemical they used is named clavacin It is produced by an organism isolated from manure. Use of an antibiotic drug to neutralize a germ poison is a new way to use these substances. Heretofore they have been used as remedies that checked the growth of germs in the body or killed them.

From the soil around potted plants in a greenhouse, University of Pennsylvania scientists have obtained two new anti-

biotics which show promise of developing into remedies against typhoid and paratyphoid fever, dysentery, cholera, anthrax and tuberculosis, and also of being active against organisms that cause ropy bread and much loss of foodstuffs thereby.

As remedies these antibiotics, known only as A-10 and A-105, have not progressed beyond the test-tube stage except for one disease. They have been tried with good results in laboratory animals as treatment for the pneumonia caused by Friedlander's bacillus, Drs. Albert Kelner, Walter Kocholaty, Renate Junowicz-Kocholaty and Harry E Morton reported.

Especially encouraging is the fact that as chemists have purified these antibiotics more and more, their action against germs has increased but their toxic effect has not. It would take 50 times the remedial dose to cause toxic symptoms

Bacteriologists are actively searching for new antibiotics because, as reported at this meeting, some germs develop resistance to streptomycin as well as to penicillin When these drugs lose their power to cure a patient, it is hoped one of the newer ones may be ready to take over

Eumycin, announced by Dr Edwin A Johnson and Kenneth L Burdon of Baylor University College of Medicine, is another of these promising new antibiotics It is active against diphtheria and tuberculosis germs and also against fungi such as cause athlete's foot.

Recovery from type three pneumonia and from anthrax was brought about in laboratory animals by still another new antibiotic, subtilin, Drs A J Salle and Gregory Jann of the University of California reported This very powerful drug had a definite suppressive effect on experimental tuberculosis in guinea pigs Its remarkable safety is shown by the fact that it is 20 times more poisonous to staphylococcus germs than to chick heart tissue.

Typhus from Pets

➤ A NEW HEALTH threat coming from the family pet dog or cat has been discovered by Dr. J. V. Irons, Miss Oleta Beck and Dr J N Murphy, Jr, of the Texas State Health Department.

Fleas harboring typhus fever germs were found on five kittens intimately associated with five human cases of typhus fever. Fleas from rats have been known for some years as spreaders of typhus fever in this country Now it appears that the fleas on kittens and puppies can give the disease to their masters

Antibiotic from Saliva

➤ FUTURE SUPPLIES of a penicillin-like antibiotic drug may come from a germ found in human saliva if practical development can be made from a discovery reported by Dr Richard Thompson and Madoka Shibuya of the University of Colorado School of Medicine at the meeting.

Green streptococci, ordinarily harmless germs, produce a substance that stops diphtheria germs from growing in the test tube The presence of the streptococci in the mouth probably would not give protection against diphtheria since there are other substances in saliva that interfere with the antibiotic action

If the material can be obtained from the saliva organisms, however, it might become another antibiotic remedy. That is a problem for future work, Dr. Thompson said

Clue to the saliva antibiotic came from a German report of a germ-checking substance they had found in saliva and called inhibine. They thought it was like lysozyme, an anti-germ chemical in saliva, tears and other body fluids discovered by Sir Alexander Fleming years before he discovered penicillin

The Colorado workers, following the German lead, were investigating saliva, trying to learn more about this germ-checking action, when they stumbled on the fact that it was the green streptococci in the saliva that were producing it

New Attack on Cancer

➤ FIRST STEPS toward a new line of attack on cancer were reported by Dr Evelyn L Oginsky and Dr O N Allen of the University of Maryland and Dr Hugh T Creech of the Lankenau Hospital Research Institute and the Institute for Cancer Research, Philadelphia, at the meeting

Still in the test tube stage, the work so far consists in linking cancer-causing coal tar chemicals with albumin from horse blood to see whether a vaccine against these coal tar chemicals could be developed Vaccines or immunizing substances are usually made from germs that have been living organisms Germs, even when they have been killed, can stimulate the body to produce antibodies to fight invasion of living disease germs. But the coal tar chemicals that cause cancer in mice when painted on the animals' backs are inert materials that do not ordinarily stimulate antibody production

When the coal tar chemicals were linked with horse or human blood albumin and then injected into rabbits, the rabbit blood was shown by test tube experiments to contain antibodies against the coal tar chemical injected and against cancer-causing chemicals of similar structure

Whether that means that the coal tar-albumin material could be used to protect animals against coal-tar-caused cancer has not yet been determined, but the results so far, the researchers re-

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ported, "make desirable" further study of the possibility

Coal tar chemicals in soot were believed to be the cause of a kind of cancer that attacks humans and was known as "chimneysweep's cancer" The chemical relationship between these cancer-causing substances and other naturally occurring substances in the human body, such as the sex hormones, has led many scientists to hope for at least a partial solution of the cancer problem through studies of the coal tar cancers in animals

Science News Letter, June 1, 1946

HYDROPONICS

Soilless Farms for Japan

In Japan the world's largest soilless gardens are under construction to supply green salad vegetables for our occupation forces.

➤ The world's biggest soilless gardens, where vegetables are raised in long beds of gravel on water solutions of fertilizer chemicals, are now under construction in Japan Details of the gardens, which will supply green salad vegetables for our occupation forces, were disclosed by Lt Col Ewing Elliott of the Eighth Army, in charge of the project, who is in Washington for a short time, to arrange for further work

Over-all area of the gardens (or perhaps farms would be the better word) is 80 acres, divided into two sections—55 acres at Chofu, near Tokyo, and 25 acres near Otsu, about six miles north of Kyoto Each consists of a series of long, shallow concrete troughs, filled with washed river gravel, through which the solution of chemicals is flowed every two days, to maintain moisture and feed the plants

In similar but much smaller gardens used during the war, tomatoes, lettuce, radishes, cucumbers and green peppers were grown successfully To this basic five Col Elliott expects now to add green onions, carrots and spinach for salad purposes Japanese labor will be employed throughout, it is expected that 1,000 men will be kept busy raising greenstuffs for the American forces in Japan

This method of producing vegetables was adopted for two reasons: Japanese methods of cultivation make it unsafe to eat any of their produce raw, and in any case Gen MacArthur wants every acre of Japanese farm land devoted to the task of staving off famine among the Japs themselves

Japanese agricultural scientists are very much interested in the project, seeing in it a possibility of increasing food production in their over-crowded country The universities of Tokyo and Kyoto are cooperating, as well as the Ministry of Agriculture Col Elliott's principal assistant is Dr Tyozaburo Tanaka, emeritus professor of horticulture at the Imperial University of Taihoku, Formosa Fifty university graduate students have asked to be taken on as laborers, to get a chance to learn the technique

Soilless gardening got its first large-scale try-out on barren Ascension island, just south of the equator in mid-Atlantic, where there was a large American airbase during the war The area of this garden, however, was only two and one-half acres, as compared with the 80-acre installation in Japan

One two-acre soilless garden is now in operation on Iwo Jima, and additional moderate-sized ones are planned for some of the other Pacific islands where American troops are stationed

Science News Letter, June 1, 1946

ENTOMOLOGY

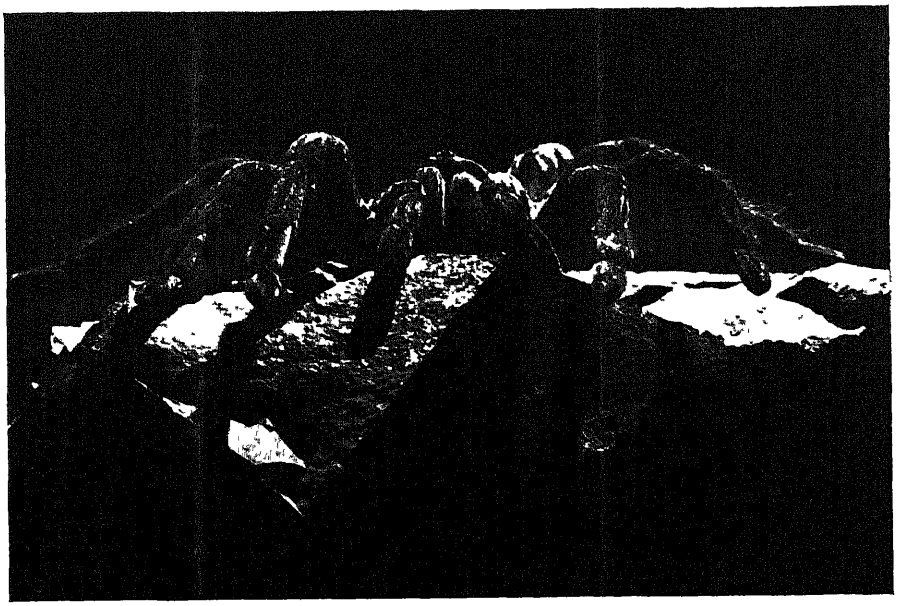
Spiders and Butterflies Wanted Wholesale

➤ IF YOU HAVE any tarantulas—really big, poisonous brutes, with all their legs attached—Ward's Natural Science Establishment in Rochester, N Y, will make you an offer This firm, pioneer in the business of supplying schools and colleges with specimens of all kinds, regularly does business with some 200 professional collectors of spiders, insects, and other many legged creeping things

Ward's regularly issues a "desiderata"—a list of things they want The current list requests wholesale lots of about 200 North American insects in all stages of development Certain kinds of moths and butterflies are wanted in quantities of 100 or more

Science News Letter, June 1, 1946

Wintergreen and chocolate top the list of preferences of spicy odors, a recent group test indicates



TARANTULA—Close-up portrait of a tarantula, poisonous spider collected in the Southwest for Ward's Natural Science Establishment, Rochester, N. Y., suppliers of natural science specimens for educators and collectors. Only the biggest specimens are taken for the establishment's stock of over 400,000 insects.

NUTRITION

Pellagra Threat

Faces the population of the Danube basin if they are forced to eat too much maize. Addition of niacin to bread may prevent this.

➤ A NEW NUTRITIONAL worry on top of all the food shortages appears in FAO plans for feeding the world next year The worry is that pellagra, hard times disease of our own southern states, may strike the population of the Danube basin

FAO estimates that continental Europe outside the USSR will in 1946-1947 produce enough food to supply about 2100 calories daily per person These estimates, however, are based on three conditions, including the one that in the Danube basin humans consume much more maize, or corn, than before the war.

Pellagra has always occurred in regions where the staple cereal is corn or maize, instead of wheat or rice. At one time it was thought there was something in maize that caused pellagra Now it appears that it is a lack of something in corn, specifically the amino acid, tryptophane, that causes the pellagra in persons relying on corn for their staple food.

Pellagra, as was discovered some years ago, can be both cured and prevented by a vitamin called niacin or nicotinic acid. People in the Danube basin can eat more maize, to help the world food situation, and still escape pellagra if they get additional amounts of this vitamin The vitamin could be added to their bread and other foods made from corn, as we now add it to our bread made from wheat Medical and health authorities, knowing the danger, can be on the alert to detect early signs of pellagra and give the necessary vitamin to cure it.

The relation between tryptophane, an amino acid which is one of the building blocks of protein, and the vitamin, niacin, has only recently come to light The late Dr Joseph Goldberger of the U. S. Public Health Service, who discovered the way to prevent and cure pellagra, first thought the cause of the disease was lack of a protein or amino acid in protein. He abandoned this idea when he found the pellagra-preventing factor or vitamin, as it was then called. It was much later that this vitamin was identified as the chemical, nicotinic acid

This identification of the vitamin came from the discovery of Prof C A Elvehjem at the University of Wisconsin that nicotinic acid cured and prevented black-tongue in dogs, a condition which is the canine counterpart of pellagra in man It is Dr Elvehjem who has given us the latest information on pellagra and diet, the relation between tryptophane and nicotinic acid or niacin Since he is not a physician, his findings come from studies of laboratory animals

Rats, he has discovered, fail to grow when fed a diet consisting chiefly of maize The growth failure can be cured, however, with either tryptophane or nicotinic acid Other scientists have found that animals fail to grow on any diet containing a lot of protein of a kind that is low in tryptophane as corn protein is The reason for this has not yet been learned, though many scientists are now working on that phase of the problem

Science News Letter, June 1, 1946

ASTRONOMY-PHYSICS

Artificial Meteor Showers from V-2 Rocket

➤ SCIENTISTS are planning to pepper the earth with an artificial shower of meteorites launched into the ionosphere from some of the other V-2 rockets to be fired this summer

A variety of small pellets believed to be the equivalent of "stones from outer space" will be placed in the head of the giant rocket and flung out from it at about 75 miles above the earth An artificial shower of "shooting stars" will result

Observed by astronomical photographic telescopes and possibly tracked by special radar sets, the synthetic meteor shower thus created is expected to tell scientists about the action and the composition of natural meteorites at that high altitude. The light given off by the meteorites from outer space will be compared with the light created by the similar friction-heating of the artificial ones as they rush into the atmosphere

The Army's ordnance experts are as interested as astronomers, physicists, and meteorologists in such prospective tests because any information about just what is contained in space beyond the reach of sounding balloons will prove practically useful as effective ranges for military rockets increase beyond the 250 miles of the present V-2.

Scientists cooperating with the Army have not yet solved the problem of ejecting from the rocket in full flight scientific instruments carrying with them records of observations First hope was to place instruments in armored spheres that would withstand the terrific impact when the rocket returns to earth But test spheres in the first rocket were not recovered from the crater about 20 feet deep and 25 feet across. So work is being begun on some method of dropping off the instruments before the rocket as a whole gets back to earth

Parachutes won't help because there is not enough air to open and float them

Science News Letter, June 1, 1946

MEDICINE

BAL Has Now Been Released to Physicians

➤ BAL, LIFE-SAVING drug for victims of bichloride of mercury and arsenic poisoning, is now available to physicians generally. Prior to release by the U. S Food and Drug Administration it was available only to a small group who were testing its value and determining best methods of use

The drug was developed by British scientists to combat the war gas, Lewisite. Its name comes from the initials for British anti-lewisite Much of the research that developed it into a remedy for mercury and arsenic poisoning was done by medical scientists of the Chemical Warfare Service at Edgewood Arsenal, Md, and civilian physicians working with them.

The very existence of the drug was a closely guarded secret during the war First public announcement was made late in 1945

Even now, the drug will be available only to physicians and must be used only by prescription and under a doctor's care It is being manufactured, in the form of ampules to be swallowed, by Hynson, Westcott and Dunning of Baltimore

Science News Letter, June 1, 1946

Sleepwalking is an attempt to obtain protection from a threatening environment and represents a flight to security.

MEDICINE

Mental Causes for Ills

Psychotherapy recommended for large number of medical patients suffering from organic disturbances caused by emotional strain.

➤ TO THE VERY large number of persons throughout the nation who are suffering from mental disorder and need psychiatric treatment must be added many more whose heart trouble, stomach trouble and even rheumatism result from upset and conflicting feelings and thoughts, it appears from discussions at the meeting of the American Society for Research in Psychosomatic Problems in New York

These people, who may make up as many as half the patients diagnosed as having heart disease or other organic disease, also need psychotherapy, as hundreds of doctors found while serving as medical officers during the war

Some idea of the size of the problem can be gained from figures reported by Brig Gen William C Menninger

In 11 Army general hospitals in the zone of the interior a survey by specialists in internal medicine showed that 24 2% of the patients in wards for heart and blood vessel disease and 20 7% of the patients in wards for stomach and intestinal disease had what doctors call functional disorders This means there is nothing wrong with the heart or other organ but it is not working properly because of the upset emotions

At station hospitals, almost half, 41%, of the heart patients and 30% of the stomach and intestinal disease patients belonged in this group who had functional disorders

The figures would have been even higher, Gen Menninger said, if the surveys had been made by or with a psychiatrist

The types of organic diseases from which these men suffered are no different, he said, from those in civilian life

"It is intriguing to speculate," he said, "why so many physicians are blind to the emotional factors in disease"

Medical education is not entirely to blame, he added

Telling the general practitioner that all these patients must be sent to psychiatrists will not help solve the problem, Dr Roy Grinker, of Chicago, said It will only alienate the doctors who are not psychiatrists and there are not enough of the latter to handle all the patients anyway.

The need is for some method by which the general practitioner can himself treat the emotional problems of these patients, although he will have to give them more than one brief interview a week.

He reported success with a method of "brief psychotherapy," although he pointed out that it is not really brief, merely briefer than the usual methods It consists in giving the patient a drug, sodium pentothal Under its influence the patient will speak more freely than otherwise and the psychiatrist can learn more quickly the underlying emotional disturbance. Treatment may be reduced from months to weeks

This quicker treatment, however, speeds up recovery only when the disturbance results from a situation, as in war In that case there is some hope of changing the situation to aid the patient's recovery If the trouble, however, results from the patient having developed as a small child a faulty attitude toward life, the treatment will be long since it involves re-educating him

Science News Letter, June 1, 1946

There are now 22 giant *tortoises* at the Bronx Zoo, of which 18 came originally from the Galapagos islands on the equator west of South America, and three from Aldabra island off the coast of Africa.

Long stalks of *asparagus* can be cooked tender their entire length if stood loosely in boiling water in the bottom section of a double boiler, with the upper section inverted to cover the tips, the steam cooks the tips

Silk gut used for fishing tackle is obtained from the silk glands of an insect closely related to the silkworm



Joint Army-Navy Task Force One photograph

SETTLING DOWN ON RONGERIK—There's no housing shortage for King Juda and his Bikini subjects on their new island of Rongerik in the Marshalls. All native inhabitants were moved from Bikini Atoll by the American government to make way for the atomic bomb test. Rongerik was uninhabited when the move was initiated (See p. 347).

PHOTOGRAPHY

To Take Photo Story of Bomb Test in Pacific

➤ BEFORE, DURING and after the atomic bombing of Navy ships at Bikini Atoll in the Pacific, movie, television and still shot cameras will be grinding out a complete picture of this greatest show in history

An aerial record of the bombing will be made from cameras mounted in planes such as the Boeing F-13 photo ship shown in the Joint Army-Navy photo on the cover of this SCIENCE NEWS LETTER Four photographic planes will be flown in the different quadrants out from the explosion to "shoot" the bombing from 20 seconds before to six minutes after the bomb is dropped Supporting these photo aircraft will be four planes standing by in event of casualties

The F-13 flying camera ship is a converted B-29 with two ultra-high-speed cameras mounted in four turrets In addition, an observer in the tail position will operate motion picture and still cameras

Science News Letter, June 1, 1946

MEDICINE

Streptomycin Dosage Must Be Right If Effective

➤ A NEW WORRY over streptomycin, that it may kill rather than cure if the dose is not just right, appears in findings by Drs Henry Welch, C W Price and W. A Randall, of the U S Food and Drug Administration

When the antibiotic was given at certain dosage levels to mice with typhoid fever, more of the animals died than would have if they had not been given streptomycin

Although these findings were made on mice, "there is no adequate reason" why this should not also occur in man, the scientists state in their report (*Journal, American Pharmaceutical Association,* May).

The dosage levels that stimulated the typhoid germs to greater deadliness are the ones usually found in the blood of humans at some time during streptomycin treatment

Alarming as the findings are, they also hold hope that streptomycin treatment may succeed in more diseases than it does at present. The drug kills the germs of typhoid fever and undulant fever in the test tube, for example, but when used to treat the disease, some patients recover while others do not Changing the dosage and treatment schedules in the light of these new findings may bring success in more cases treated

Discovery came about through puzzling inconsistencies in results from routine test tube experiments on streptothricin, a drug closely related to streptomycin Laboratory workers observed that relatively high concentrations of the drug did not interfere with the activity of germs as much as somewhat lower concentrations did Substituting streptomycin for streptothricin, and using typhoid organisms for the test, they obtained essentially the same results

Why streptomycin within a relatively narrow range of dosage, can either stimulate germs to greater deadliness or overpower them has not yet been determined

Science News Letter, June 1, 1946

MEDICINE

New Chemical Effectively Treats Scrub Typhus

➤ SCRUB TYPHUS, one of the severest diseases encountered by U S troops in the Pacific and Asia, can be successfully treated with a chemical, para-aminobenzoic acid, the War Department's U S A Typhus Commission makes known in a recent report (*Journal, American Medical Association,* May 25).

Until carefully controlled clinical tests made by Lieut Nicholas A Tierney, Navy surgeon, at Assam, India, demonstrated that the drug in large doses is "an effective therapeutic agent" for tsutsugamushi disease, no successful treatment had been known

In the test conducted during the building of the Ledo Road through jungle territory where the mites that carry the disease are plentiful, one patient received at the hospital was given PABA, as the drug is called for short, while the next patient was given the best standard treatment without the chemical In this way 18 patients were given the new treatment and compared with 16 who did not receive it

Three of the control cases died, while none of the cases treated with para-aminobenzoic acid were fatal Patients who were given the chemical had fewer days of fever, less severe symptoms and complicating symptoms and a shorter convalescence period Lieut Tierney emphasized that the chemical should be administered in the first week of the disease.

Science News Letter, June 1, 1946

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PHYSICS

Atomic Science May Be Applied to Glass

➤ AN EXTENSIVE research program to apply findings of wartime atomic science to glass technology is proposed This is a recommendation of the glass division of the American Ceramic Society

Dr Alexander Silverman of the University of Pittsburgh, chairman of the research committee, states that there now is possible a radioactive form of each of the chemical elements

Those employed in glass manufacture, he says, would tell how raw materials melt, how the glass flows during melting, where the materials are located in the finished glass, and might account for defects in imperfect glass Some of the newer elements will produce glasses possessing new properties and colors, he adds

The proposal includes the collection and distribution of funds for glass research in educational and industrial research laboratories throughout America to keep this country in the forefront in glass technology and manufacture.

Science News Letter, June 1, 1946

PHYSICS

300-Mile Oceanic Layer Reflects Sound Waves

➤ SOUND WAVES sent into the Pacific Ocean off the coast of California by Navy sonar devices will bounce back from 1,000 to 1,500 feet below the surface when they strike a 300-mile wide oceanic layer suspended between the floor of the ocean and the surface, scientists at the Navy Electronics Laboratory of the University of California Division of War Research have reported

This sound-stopping layer extends from Point Mendocino, 200 miles north of San Francisco, to Cape San Lucas at the tip of Lower California, and is the deepest oceanic layer known

Scientists are not sure what composes the layer, but one theory is that plankton, small marine animals, make up the sound barrier. Other suggestions are that the echo may be caused by larger fish feeding on plankton or that gas bubbles from the undersea life reverberate sound

Science News Letter, June 1, 1946

...E FIELDS

ACOUSTICS

New Instrument Aids Deaf To Use Telephone

➤ DEAF PEOPLE will be able to carry on a telephone conversation with a new instrument demonstrated to the Acoustical Society of America It is called a sound spectrograph and translates any sound into a visual pattern With a little training, deaf persons can learn to read the patterns and literally see what the other party has to say.

Drs W Koenig, H K Dunn, and L Y Lacy of the Bell Telephone Laboratories, inventors of the spectrograph, explained that the new instrument would be used first for the rapid and accurate analysis of sound It is a wave analyzer that produces a permanent visual record of the sound's energy distribution in both frequency and time

Another session of the acoustical meeting learned that "silent as a fish" is an obsolete expression Drs Donald P Love and Don A Proudfoot of Columbia University declared that the croaker, among other fish, can make a noise that, if it were in air, "would compare favorably with a boiler factory"

Noisy fish became important during the war when their sounds threatened to interfere with the detection of enemy submarines

Science News Letter, June 1, 1946

NUTRITION

Vitamin B Complex for Starving Populations

➤ AN INCREASE in the food supplies of the war-ravaged nations of Europe and Asia can be achieved simply by feeding vitamin B complex to the starving populations

This was suggested at a meeting of the American Gastro-Enterological Association by Dr T L Althausen, associate professor of medicine in the University of California Medical School

Dr Althausen reported significant new experiments with animals in which it was shown that maximum utilization of foods can be obtained only if there is an adequate supply of vitamin B complex

Stating that there is a significant increase in food utilization in rats recovering from a deficiency after administration of the B complex, Dr Althausen said that no single component of the complex was alone responsible for the increase While vitamin B_1, or thiamin chloride, made the most marked difference, the lack of any one decreased food utilization

Dr Althausen said that the administration of the B complex also causes an increased intestinal absorption of glucose, a sugar which contributes to gain in body weight

Failure to insure that deficient persons are given an adequate supply of all the B complex vitamins in effect results in a waste of food, since it will not be utilized to the maximum

"Another reason for supplying under the present conditions in devastated countries adequate amounts of vitamin B complex which apparently acts as added food by increasing the efficiency of utilization of available food is its small bulk and low cost," Dr Althausen stated.

Dr Althausen's report was prepared in collaboration with Dr John J. Eiler, associate professor of pharmacy and biochemistry, and Mabel Stockholm, researcher

Science News Letter, June 1, 1946

PHOTOGRAPHY

Built-In Flash-Blub Holder For Small Camera

➤ A SMALL CAMERA with built-in flash-bulb holder, designed especially for photographing small objects at a few inches' distance, is the invention on which U S. patent 2,400,483 has just been granted to William J. Cameron of Chicago

For finding and focussing, a prism is inserted between the lens and the shutter, to throw the image upward to a second reflecting prism, which in turn directs it backward to the eye of the operator. He is thus able to see exactly what he is going to photograph

When the operator is ready to make his exposure, he moves a lever that lifts the prism out of the way, and at the same time opens the shutter Simultaneously, the flash-bulb is fired Then the shutter closes

The flash-bulb is set into a cylindrical housing beneath the lens barrel, so that it throws its light directly on the object. In front of the bulb is an adjustable diaphragm, so that the amount of light can be controlled at the operator's will The battery is contained in a downward-projecting cylinder, which also serves as a convenient handle.

The inventor states that the camera was designed especially for the use of physicians, surgeons and dentists, but its application in many other fields is obvious

Science News Letter, June 1, 1946

PHYSICS

Muzzle Attachment Eliminates Gun Flash

➤ OPTICAL METHODS of studying air streams travelling faster than sound led to the development of a device to eliminate the telltale muzzle flash of a soldier's gun

The same methods now have an application in airplane design, particularly in the development of craft for supersonic speeds and of efficient orifices for jet propulsion

The actual elimination of the flash from a discharging gun is due to a muzzle attachment which changes the flow of exploding gases from small caliber arms, but the device is a result of laboratory studies of gases escaping at high pressure from tubes, made possible by the special optical methods

These optical methods, developed during the war, result from work done at Princeton University by Dr Rudolf W. Ladenburg, Dr Cletus C Van Voorhis and Dr. John R Winckler After a beginning had been made, the U S Navy became interested and all later work was done under a Navy Ordnance contract.

In carrying out the study of muzzle flash, what scientists call the interferometric technique was used. This employs light rays as a means of measurement. It is an advance over mechanical measurement devices because these cause deformation of the gas stream.

The methods developed here are based on earlier work The noted physicist Albert A Michelson demonstrated 60 years ago how light rays might be used to study optical effects in gases. Austrian and German physicists had applied optical methods to the study of supersonic phenomena. No one in this country or in England had ever used an interferometer for studying the behavior of supersonic air streams flowing around objects when the war work was begun at Princeton.

Science News Letter, June 1, 1946

GEOGRAPHY

Geographical Guinea Pig

Scientists from all fields will study results of the atomic bomb test at Bikini on land, in the sea and in the air for many years to come.

By MARTHA G. MORROW

➤ BIKINI ATOLL, one of the least known island groups in the world until the proposed atomic bomb tests brought it into the limelight, by the end of June will have been as thoroughly scrutinized as any spot on earth Plants and animals on the island, fish in the lagoon and surrounding ocean, geological formation of the island itself, wind and currents—all are being extensively surveyed prior to the atomic bomb tests to be held during the coming summer

Until a year or two ago little was known about these palm-covered bits of land in the atoll The only detailed maps of the region were those captured from the Japanese Vessels that might have brought back reports on the atoll and surrounding waters were forbidden to go near this or any other atoll of the Jap-mandated Marshalls group

To biologists these atomic tests, which will drastically reduce all life in the area, offer an ideal man-made opportunity to study how new life is introduced to a region After the test, biologists will return periodically to explore the possibility of life having survived the explosion and to study new types of life as they appear on the atoll But first they must know what life exists there today, so the snails, clams, crabs, lizards, lagoon fish, terns and frigate birds are being carefully catalogued

Not only is Bikini being thoroughly investigated, but neighboring atolls as well Currents in this region flow in the direction of the Philippine Islands and Asia Thus Eniwetok atoll, which is down current and might possibly be contaminated by powerful radiations due to the explosion of the atomic bomb, and Rongerik atoll, which is up current and probably won't be contaminated, are both being scrutinized

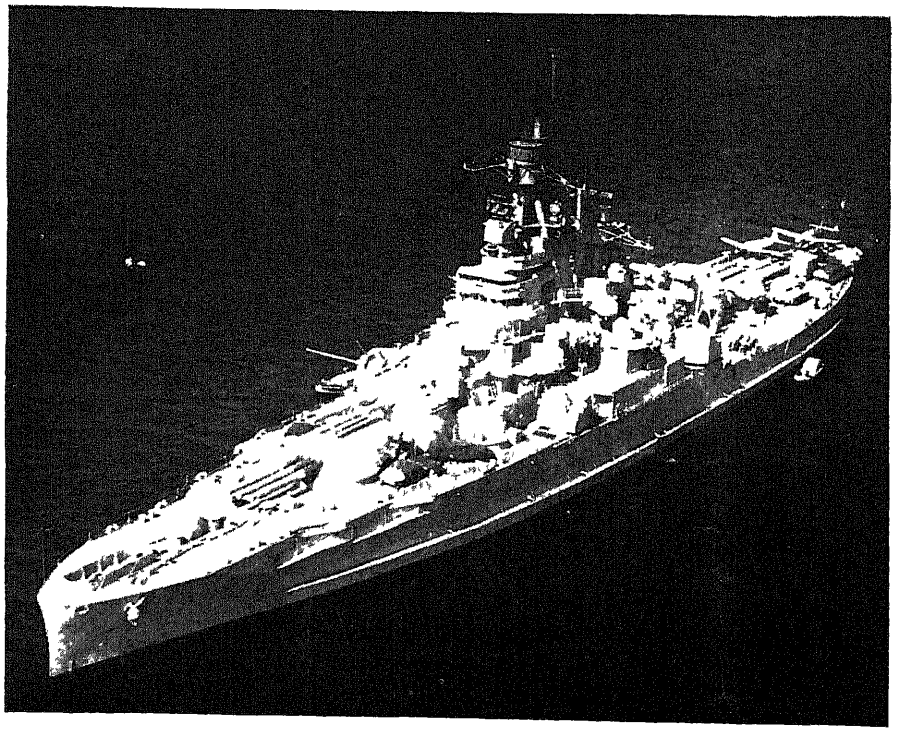
The worst that could happen is that every animal on the island will be killed Then if larvae from neighboring islands could not survive the long trip, life there would fail to return to the island afterward unless imported by man On the other hand, if some animals survive the terrific explosions of these devastating bombs, new species due to the powerful radiations may develop Certainly if a new type of life is begun, scientists want to be present at its birth

The soil on Bikini is generally too poor for agriculture Coconut palms are about the only trees, but there are also some pandanus, breadfruit and papaya Among food plants, arrowroot is of considerable importance, taro and yams are somewhat less common A strip of scaevola bushes generally grows as a mangrove thicket along the water's edge The extent of damage to plant life and how long it takes for the island to regain its vegetation will be determined by precise and long-continued surveys

When the atomic bomb bursts over Bikini atoll, a lot of fish will undoubtedly be killed Marine biologists, with the assistance of a corps of expert fishermen, will study the effect of the explosion on fish inshore, in the lagoon and in the open ocean Reef fish, upon which the natives lived, are expected to suffer, but life in the open ocean probably won't be affected much

Early objections to the bombing experiments, on the score of possible material harm to commercial fisheries and the whaling industry, have been overcome by the selection of Bikini atoll as the site. The fish here, though abundant enough, are too far from any possible market to be of economic significance, and the little coral island is remote from all known paths of whale migration

To study where water containing the radiant materials will drift, a contamination survey is being planned Tests will show the amount of radiation in the water near the atoll and also some distance from it This will help determine how soon people can safely return to the region The irradiated particles will also show the path followed by the ocean



Joint Army-Navy Task Force One photograph

BULLSEYE FOR ATOMIC BOMB—Glistening in her new bright orange-red paint is the USS Nevada which is to be the center target for the joint Army-Navy atom bomb test at Bikini. First of the Navy's oil-burning superdreadnaughts, the Nevada is a veteran of 30 years' service. Although now declared obsolete, the splendid lines which made her famous are still unspoiled.

currents in this region, concerning which little is known at present

There are over 20 islands in the atoll, of which Bikini is the principal one This coral ring, 21½ miles long, is about 2100 miles from Honolulu and 2450 from Yokohama The 167 men, women and children living on the island, of Melanesian and Chammoro extraction, consented to be moved to a previously uninhabited island 109 miles east, in the Rongerik atoll

Atoll of Live Coral

An atoll is formed from a bed of live coral which is thought by some scientists to have been built upward gradually from submerged mountain peaks that at some time in the geological past rose close to the surface of the sea Presumably because the coral polyps at the edges of the bed, and particularly to windward, receive more food, they build more rapidly and form an irregularly circular reef of live coral surrounding a shallow lagoon The maximum depth of the Bikini lagoon is about 200 feet The bottom is flat and sandy except where cones of live coral rise to or near the surface

By breaking off fragments of coral and carrying them inward, the waves have created islands here and there around the reef Elsewhere the reef, typical of atolls, rises only to or near the surface of the sea at high tide, and is broken at one or more places by passages through which the tides flow to and from the lagoon

Geologists hope to find the depth of the coral layer through the atomic bomb explosion and to determine definitely whether the peak upon which the atoll is built is of volcanic origin After an explosion has been set off, much can be told concerning the type of material through which the vibrations travel by clocking the time needed for them to be "echoed" back to the surface by the various layers

Waves near the explosion are expected to be several scores of feet high but the wave height will rapidly decrease much like the height of ripples when a pebble is dropped into a pond Thus, the waves will probably not break over any of the islands in the atoll even though the highest point on any of these is only about ten feet "Wave people" are on the scene to measure the height, wavelength, and speed of the waves with instruments, cameras, echo-sounding machines, and television

Unanswered questions include how such waves would act and how much surrounding islands would interfere with their normal course All the instruments set up to measure the waves are remote-controlled so that the people in charge will be a long, long way off

Participating Agencies

A number of institutions are taking part in this scientific survey They include the U S Navy Hydrographic Office, the Woods Hole Oceanographic Institution, U S National Museum, the Fish and Wildlife Service of the U S Department of the Interior, the U S Geological Survey, and the U S Coast and Geodetic Survey The University of California through its College of Engineering and the Scripps Institution of Oceanography, the University of Southern California and the University of Michigan will also be represented The U S. Navy Electronics Laboratory at San Diego, the Geotechnical Corporation of Boston, the U S Navy Mine Warfare Test Station at Solomon's Island, Maryland, and the Bureau of Ships of the Navy Department will also cooperate in the study

Two ships belonging to the U S Navy's Hydrographic Office are on the scene Complete floating laboratories, the *USS Sumner* and the *USS Bowditch,* include all the equipment necessary to survey the area, test ocean currents, take the temperature of the water, identify material on the ocean bottom and study weather conditions Both are stocked with all the apparatus needed to design and print maps on the scene In addition, six smaller ships are being employed

As this area will probably be the center of scientific investigation for years to come, the results of these surveys will be coordinated and published by the newly-established Division of Oceanography of the Hydrographic Office, so that all known information on this closely-scrutinized geographical guinea pig will be available.

Science News Letter, June 1, 1946

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

WYOMING

A Summer to Remember

The 900-acre Paton Ranch will give you trout-fishing in a mountain stream in the foothills of the Big Horn mountains, daily horseback rides along picturesque canyon trails and excellent food—most of which is grown on the ranch.

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INVENTION

Electric-Eyed Machine "Inspects" Plants

➤ A HOEING MACHINE, designed for thinning and weeding operations in such crops as sugar beets and cotton, "inspects" the plants with an electric eye before it chops out weaklings and weeds, sparing the stronger, more promising specimens It is the invention of Leo A. Marihart of Monterey County, Calif, who has just been granted U S patent 2,400,562 on the device.

Mechanical cotton-choppers and beet-thinners have been invented, but they have the weakness of being entirely mechanical They knock out predetermined spaces in the rows of young plants, and it is a matter of chance if they spare the right ones

In Mr Marihart's invention there is a revolving set of blades that block out whole segments of the line Following after it, however, is another set of blades whose action is intermittent, they swing round and clip out finer bites of soil and roots only at the bidding of photocells that "look" at each plant through light filters and "decide" whether it is a weed or a desirable citizen of the crop community

Science News Letter, June 1, 1946

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A *white powdery product* of sand, recently developed, gives rubber compounds the same qualities obtained through the use of carbon-black; with the new material rubber overshoes need no longer be black

Gizzards in birds, in which the food swallowed is ground up, working in conjunction with powerful gastric juices, perform amazing feats; sea ducks, for example, swallow whole crustaceans, and reduce the shells to fine sand

Non-alcoholic beverage is made in Germany from sugar beets; the beets are steamed in an autoclave for 15 minutes under one-half atmosphere pressure, then the juice is squeezed out in a cider press, filtered, bottled and carbonated

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AERONAUTICS

Safe All-Weather Flights

More important at present than economy, the development of speed or any other factor in air transport are safe instruments for blind flying.

➤ ALL-WEATHER FLYING that will bring regularity in service is needed for air transport development more than greater speed or economy, Dr. Edward Warner, president of the Interim Council of the Provisional International Civil Aviation Organization, told the George Westinghouse Centennial Forum in Pittsburgh

More than half of the improvements in air transport that will be brought about by science and technology in the next ten years will lie in the development of navigational aids and blind landing systems that will permit flying under all weather conditions, Dr Warner declared

Some system of instrument landing, however far from perfect, must be adopted immediately, he said. Present radio approach methods, designed only to bring the pilot to the edge of the airport, have brought no substantial change in the worst allowable weather conditions under which flights may be authorized

Experimental blind landing systems have been used with almost perfect results in military operations, permitting flights in all but the most violent thunderstorms and icing conditions, Dr. Warner continued It will be the job of the PIACO during the coming summer to make a choice from the available systems and to obtain its international acceptance.

Control of the rapidly mounting traffic at airports continues the outstanding problem still demanding solution. Dr Warner predicted that it may be found in some form of search radar system to be installed in each aircraft Such a device will enable the pilot to tell at a glance the position, direction and speed of neighboring planes so that he can land, when flying blind, with the same certainty and safety as under conditions of perfect visibility

The first general assembly of the PIACO met May 21, 1946, in Montreal, and the work will continue throughout the summer The 44 nations that are now active members will tackle these problems In addition, Dr Warner said, the representatives of the 44 nations will try to remove other obstacles in the way of free international air transportation

They will adopt an international air line operation code designed to bring about a minimum of delay and inconveniences to air travellers arising out of numerous visa, passport, and customs regulations Proposals have been made for all nations to grant six-month visas, not to require a separate visa for each entry, to exempt aircraft in transit from inspections, and to give crews and passengers assistance in the event of unscheduled emergency landings

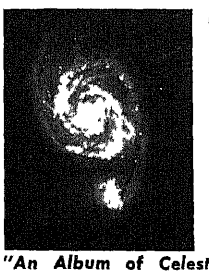
International agreement on all these points is needed because during the next summer the airlines of six nations will be maintaining regular trans-Atlantic service. More than this number of nations have already established operations between England and the continent of Europe, Dr Warner reported.

In the United States alone, statistical records show an increase between 1935 and 1945 of 1200% in passenger traffic, as much as 1800% in express, and 1500% in mail carried by our air lines, Dr Warner pointed out. He predicted that about 50,000 people will cross the Atlantic by air this year, and from two to three times that number during 1947

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the Forum by Vice Admiral Emory S Land, former Maritime Commission chairman and now Air Transport Association President, comes into effect.

One of the freedoms under the United Nations should be the freedom of travel, Adm Land said As a first step, he advocated the adoption of one simple form of passenger identification, and one equally simple form of property bill of lading for all nations of the western hemisphere. This, should eventually be extended to all members of the United Nations

With relaxation of restrictive laws and regulations, he predicted the possibility of a large peace-time merchant fleet of from 15,000,000 to 20,000,000 tons, of which 7,500,000 tons would be for foreign trade

Our foreign trade should amount to approximately $10,000,000,000 yearly, Adm Land predicted. This will generate 3,000,000 jobs in industry alone, in addition to absorbing the output of 1,000,000 people engaged in agriculture

Influence of Helicopters

Helicopters in our backyards may have as great an effect on our cities as the automobile, how much is still largely a matter of speculation, Harland Bartholomew, Planning Director of the St Louis Regional Planning Association, declared at the Forum

The rapidly increasing volume of air transport, however, is already showing its effect on our cities in the need for the construction of many different types of air terminals, he added The number of aircraft will increase from a prewar total of 25,000 to approximately 400,000 by 1950

In our large urban areas there will be one or more major fields for scheduled main-line-passenger, mail, and express traffic, and separate fields for scheduled trunk-line freight service and feeder lines

Secondary fields will serve commercial and chartered service, there will be numerous minor landing strips for private industrial use, privately owned personal planes, and schools, besides airports for military use

Mr Bartholomew predicted a comeback of the street-car The old-fashioned trolley, with modern design changes, is still the most efficient transport unit for areas of moderately high population density. The trolley coach is expected to be introduced into a number of cities where its flexibility and absence of tracks are major factors

Science News Letter, June 1, 1946

SEISMOLOGY

Path of Tidal Wave May Be Forecast

➤ WHEN ANOTHER earthquake on the ocean bottom produces a tidal wave, the destructive ocean sweep's arrival on any neighboring coasts may be more accurately forecast because of records kept of the Alaska wave that recently brought death and destruction to Hawaii

Although submarine earthquakes rarely produce the destructive waves, records of tide stations at more than a score of points in the Pacific are being analyzed by the division of tides and currents of the Coast and Geodetic Survey to trace the course of the unusual wave that did develop in the Pacific Records showing the exact time at which the tide gauges picked up the oscillations from the wave have been gathered from stations extending from Alaska to Chile and including such outlying points as Honolulu

In predicting the wave that swept out of Alaska, scientists of Coast and Geodetic Survey fixed the time of arrival in Hawaiian waters within four minutes of the actual recorded time, it was reported The readings show that the wave was not one long movement, but rather a series of sharp thrusts

Reaching a top speed of about 600 miles per hour, the wave averaged 500 miles per hour in its fateful dash from the epicenter of the disturbance in Alaskan waters to Hawaii.

Despite the tremendous speed of the wave as it struck land, Coast and Geodetic Survey officials say that it lost speed near shore because of the shallower depth

Records kept by a tide station at Valparaiso, Chile, 8,000 miles from the epicenter, revealed as marked oscillations as instruments at Honolulu, 2,300 miles from the origin of the wave.

Standard tide gauges maintained by the Coast Survey operate automatically and record tidal movements on a wide paper tape Throughout the Pacific, the recent tidal wave was marked distinctly by most of these instruments

Science News Letter, June 1, 1946

CHEMISTRY

New Kind of Mold Used in Citric Acid Production

➤ CITRIC ACID, heavily used in soft drinks, confectionery and medicines, is nowadays produced mainly by mold fermentation An improvement in this process is the subject of U S patent 2,400,143 which has been issued to Prof. Selman Waksman, of Rutgers University, best known as discoverer of streptomycin and pioneer investigator of antibiotics generally

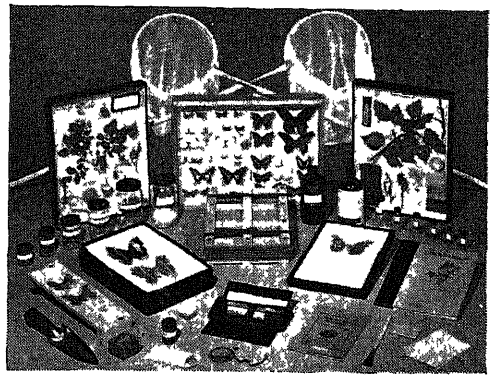
One difficulty that has beset mold production of this acid is that the mold culture also produces oxalic and gluconic acids at the same time, necessitating costly separation processes. Prof Waksman uses a different species of the Aspergillus mold from that commonly employed, and conditions the sugar solution on which it feeds with salts of iron and zinc He states that in this way he is able to obtain an output of practically pure citric acid.

Rights in his patent are assigned to Merck and Company, Inc

Science News Letter, June 1, 1946

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ENTOMOLOGY

NATURE RAMBLINGS by Frank Thone



'Teen-Age Insects

➤ THIS WEEK is the big week for "17-year locusts" In parts of the Midwest and Southwest, big, brown, shiny-winged insects are swarming by billions out of holes in the ground and making the air dizzy with their song

There is no need, though, to fear for our precious crops. They aren't really locusts—that name somehow got stuck to them by mistake Their real name is cicadas

Although they all look alike, there are two kinds of them A dense brood is emerging all over central and southern Iowa These belong to the 17-year cicadas, which is the northern species The southern species, which is swarming from Missouri and central Illinois south through Arkansas and thence eastward to the Carolinas, are 13-year cicadas

They will hang around for a month or six weeks, singing, mating and depositing their eggs in the soft bark of young tree twigs Then they will all die, and nothing more will be seen of them until the end of their respective 17-year and 13-year cycles During all that time the young that hatch from the eggs and drop to the ground will be living in subterranean burrows, sucking sap from roots With this strange existence of many years underground and a few weeks of sunlight and song, they are the longest-lived of known insects

Scary folk will see an omen of coming war in the bright orange "W" formed by a junction of veins on each wing But that "W" always appears, whether the world is at war or peace

Science News Letter, June 1, 1946

About 3% of the *deaf* have a deaf parent.

BIOCHEMISTRY

Riboflavin Needed for High Altitude Living

➤ THE BODY cannot adjust to conditions of high altitude without an adequate supply of riboflavin, or vitamin B_2, it is indicated in experiments at the University of California, which also provide further evidence that this vitamin is essential in carbohydrate metabolism

If the body has a sufficient supply of riboflavin it makes an unusual adjustment to the low pressure of high altitude The body burns up carbohydrates faster to do the job ordinarily done by a normal supply of oxygen at sea level

Dr Agnes Fay Morgan, noted nutritionist and professor of home economics, and Mary Wickson, researcher, found that in riboflavin-deficient rats this adjustment to an increased consumption of carbohydrates is not made

However, if injections of riboflavin are given the deficient rats just before exposure to high altitudes, the adjustment is almost normal The work indicates that persons flying at high altitudes be given adequate supplies of riboflavin While the research was done to aid in combat warfare, it is also applicable to peacetime flying.

Dr Morgan said also that the results may indicate that persons living in mountainous areas at high altitudes may need extra supplies of riboflavin to insure an increased carbohydrate metabolism to compensate for a decreased supply of oxygen in the air

Science News Letter, June 1, 1946

GENERAL SCIENCE

Young Scientists Were Not Drafted in Russia

➤ RAPID ADVANCE of Soviet research which "threatens America's leadership in science" is due largely to the ample supply of young Russian scientists who were not drafted into the armed services even during the war, Dr I. M Kolthoff, University of Minnesota chemistry professor, charged in a speech before the American Chemical Society Delaware section.

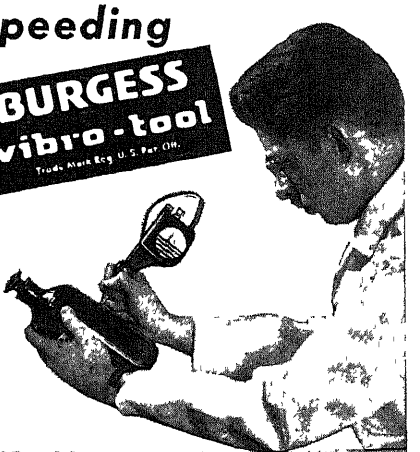
America will have to pay a high price for the short-sighted policy of drafting our present generation of young scientists into the armed forces, Dr Kolthoff declared, basing his opinion on observations during a scientific trip to Russia last year.

Science News Letter, June 1, 1946

ESSENTIAL

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THE BUSINESS LAW OF AVIATION—Gerald O Dykstra and Lillian G Dykstra—*McGraw-Hill,* 532 p, $5 A combined text and case book in aviation law, presenting a convenient compilation of the leading court decisions which have involved some aspects of aviation, and calling attention to the federal and state statutes which govern this field of business

A CHRONOLOGICAL HISTORY OF ELECTRICAL DEVELOPMENT—*National Electrical Manufacturers Assn,* 106 p, $2 The story, by dates, of electricity and the vast assortment of devices and equipment created by the electrical manufacturing industry to utilize it

COMISION IMPULSORA Y COORDINADORA DE LA INVESTIGACION CIENTIFICA Anuario 1944—*Comision Impulsora y Coordinadora de la Investigacion Cientifica,* 405 p, tables and illus, paper, free

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GERMAN FOR THE SCIENTIST—Peter F Wiener—*Chemical Publishing Co,* 238 p, $3 50 A condensation of German grammar and reading material from modern German literature in chemistry and physics Translations of the passages are also given

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AN OUTLINE GUIDE TO THE ART OF THE SOUTH PACIFIC—Paul S Wingert—*Columbia Univ Press,* 84 p, illus, $2 For each major area and island group are given historical and geographical data, a description of the natives, and the distinctive elements of the culture, these are followed by a comprehensive listing of the art forms, for which physical facts, meaning, and function are included

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PRINCIPLES OF PHYSICS II, Electricity and Magnetism—Francis Weston Sears—*Addison-Wesley,* 400 p, tables and illus, $5 The second volume of a series of texts written for the two-year course in general physics at Massachusetts Institute of Technology A knowledge of mechanics, heat, sound, analytic geometry and some calculus is presupposed

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Science News Letter, June 1, 1946

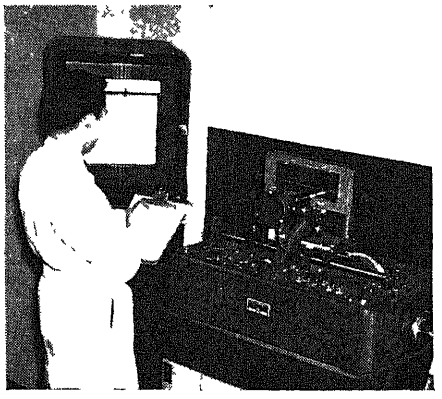


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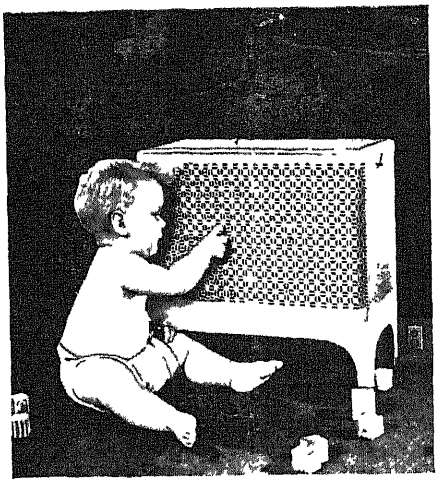
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⚙ *COIN-OPERATED RADIO for hotel rooms gives two hours of operation for a quarter It looks like an ordinary radio receiver but has a slot for the coin, and the coin mechanism inside An electric timing device, which operates only while the set is in operation, assures 120 minutes of program, continuous or intermittent*

Science News Letter, June 1, 1946

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⚙ *GRASS CUTTER, to cut tall stems passed over by the ordinary lawnmower, is a two-wheeled affair with a handle and a series of pointed teeth between the wheels swung low over the ground On each second tooth a double-edged razor blade is fixed, with both edges exposed, against which the stems are pressed*

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Question Box

ACOUSTICS

What new instrument will aid the deaf to use the telephone? p. 345

AERONAUTICS

The growth and arrangement of our cities will be influenced by what flying machine in the future? p. 349

ENTOMOLOGY

What is the real name of the 17-year-locust? p. 350

GENERAL SCIENCE

What did the Russians do about young scientists during the war? p. 350.

GEOGRAPHY

What are atolls made of? p. 347

HYDROPONICS

Where are the world's largest soilless gardens being built? p. 341

INVENTION

What instrument aids a new hoeing machine in its job of chopping out weeds? p. 347

MEDICINE

Typhus fever has been effectively treated with what new chemical? p. 344

What new drug cure is contemplated for tularemia? p. 339

What war-time-developed drug has been released to physicians? p. 342

What treatment is recommended for many people complaining of aches and pains?

NUTRITION

What disease is threatening the starving people of the Danube basin? p. 342

PHYSICS

Atomic science may be applied to what field of physics in the future? p. 344

What methods have been developed for studying air streams travelling faster than sound? p. 345.

Where published sources are used they are cited.

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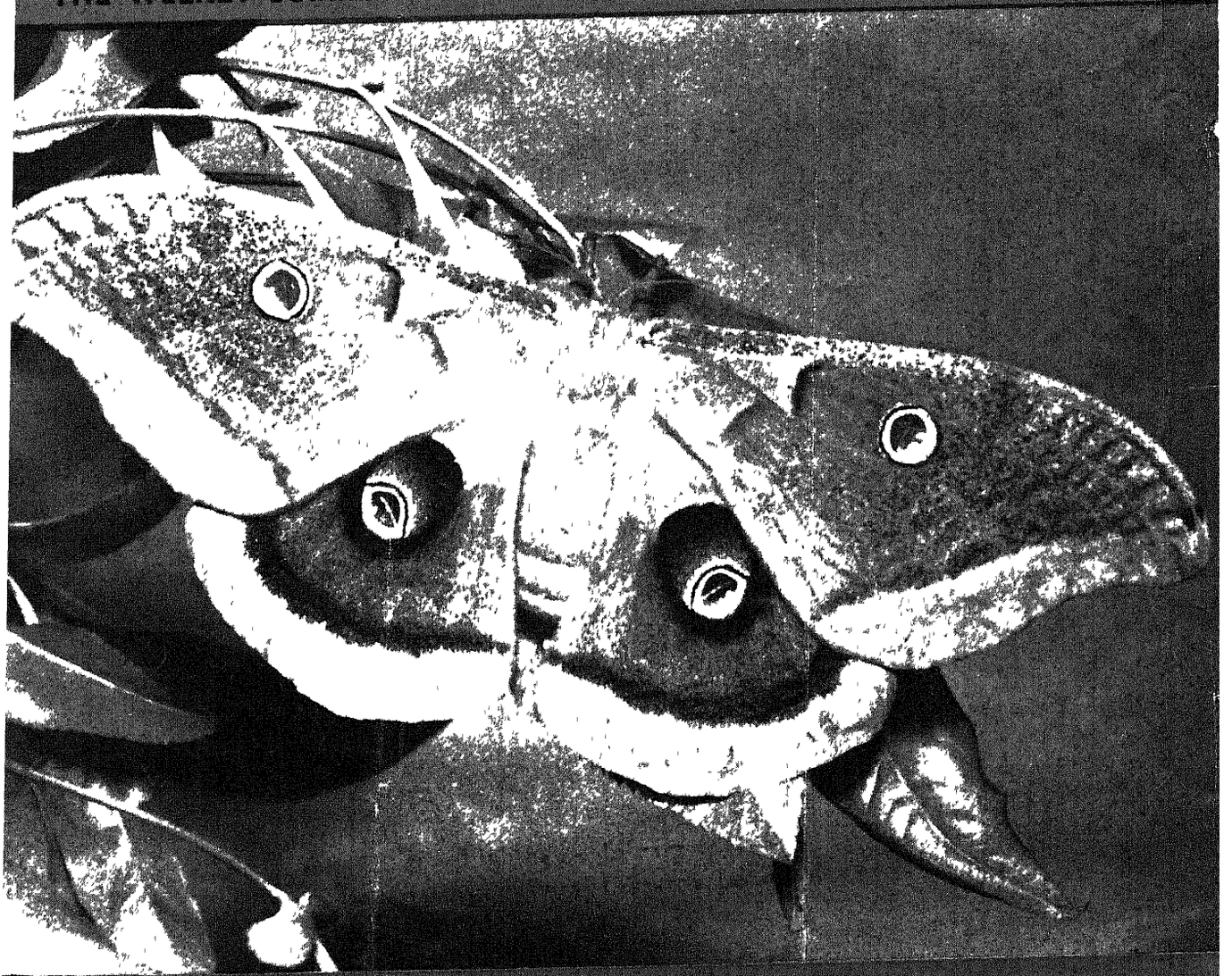
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Vol. 49, No. 23

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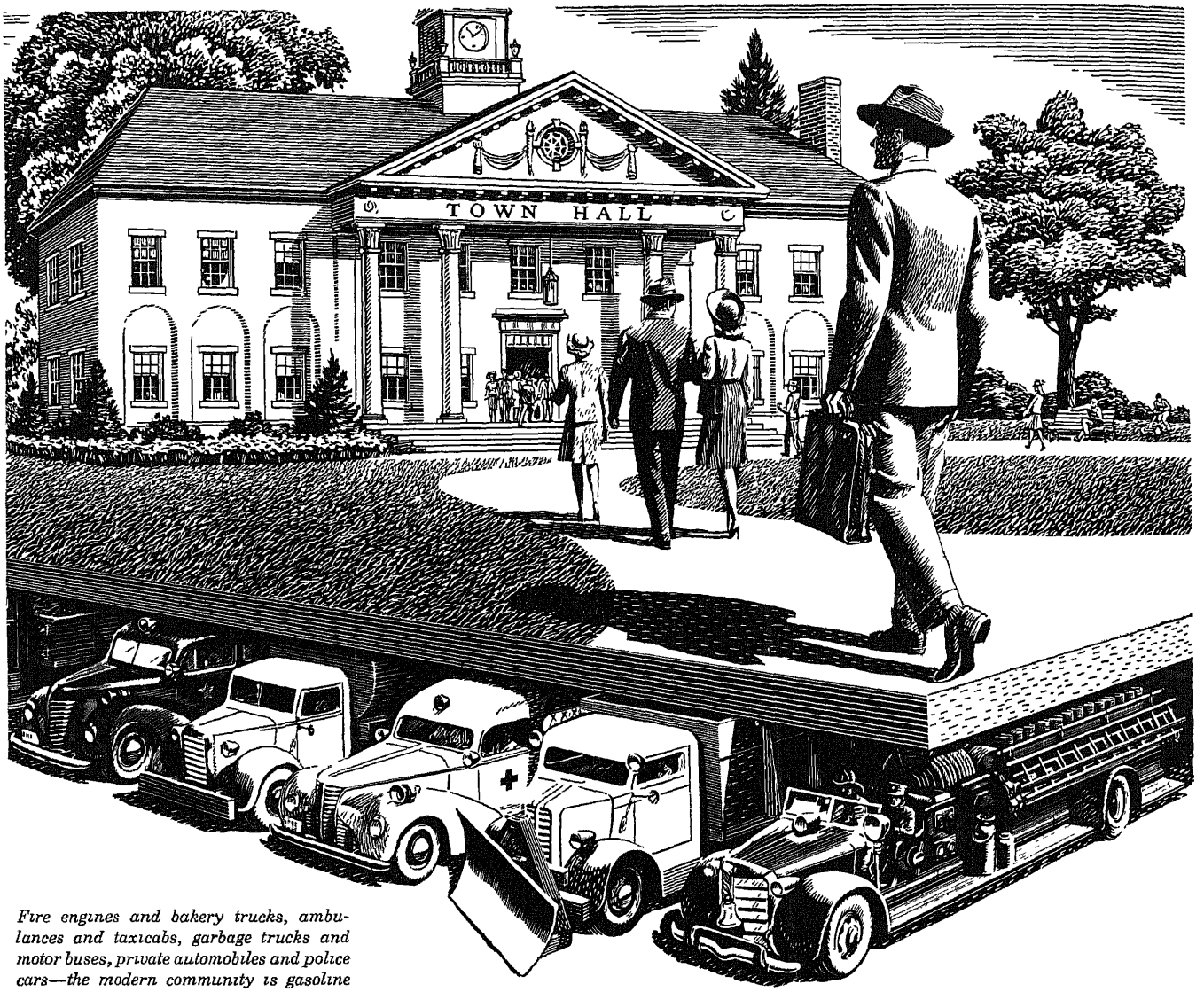


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PSYCHIATRY

Drugs for Mental Diseases

New remedies are reported for treatment of various mental disorders, and one to improve behavior of problem children. Hope for alcoholics suggested.

➤ LACTIC ACID, known to the layman in buttermilk and sauerkraut juice, adrenalin and medically induced delirium are new treatments for mental disease reported at the meeting of the American Psychiatric Association in Chicago

Doses of lactic acid and sodium lactate given in milk helped seven severely depressed patients recover, brought marked improvement to five more and some improvement to another 14, Drs Hans Lowenbach and Maurice H Greenhill, of Duke University School of Medicine, reported

The other 19 of the 45 patients treated were not helped

The reason for giving the lactic acid was that this chemical is produced in the body in the violent muscular activity that occurs during shock treatment The Duke psychiatrists thought that this might be the factor responsible for recovery of some patients following shock treatment

Most of the patients and medical students on whom the treatment was first tried had a short period of stomach distress following the dose of lactic acid This soon subsided and was followed by drowsiness and relaxation Patients were able to sleep who previously had required sleeping medicine

Adrenalin, one of the hormones produced by the adrenal glands, offers a definite prospect of aid to patients with persistent anxiety states, Dr D Ewen Cameron of McGill University believes from his experience with this treatment

The chemical is given by injection into the muscles or veins The treatment is time-consuming and tedious and should not be undertaken unless both patient and physician are convinced nothing else will help, Dr Cameron warned.

Patients get some relaxation and symptoms disappear temporarily at the end of a day's treatment In the course of many months, the symptoms gradually disappear altogether Dr Cameron believes the results so far warrant attempts to find better methods of using the treatment so that it can become practical.

The good results with artificial delirium were reported by Dr Thomas J Heldt of the Henry Ford Hospital, Detroit He finds it universally beneficial for patients with borderline psychiatric disorders

The delirium is induced by sodium amytal given in large enough doses to keep the patients asleep from 12 to 20 hours every day for from five to 12 days No solid food but plenty of liquid nourishment is given during this period When signs of a toxic condition begin to develop, the drug is stopped, fluids reduced and delirium produced The delirium usually lasts three to six days During this time the patient's inhibitions are released and he can more readily answer the psychoanalyst's questions Through this, he gains understanding of himself and can adjust better to life

Problem Children

➤ A DRUG THAT makes problem children behave better has been discovered by Dr Charlotte F Walker and Miss Barbara B Kirkpatrick of Duke University School of Medicine

The drug is diphenylhydantoin sodium and goes under the trade name of dilantin

Before parents of unruly children start a run on the neighborhood drug store, they should consult their physician The drug is sold only on a doctor's prescription

It was developed about 10 years ago for treatment of epilepsy and has greatly aided some patients with that disease Its new use for problem children was announced by the Duke researchers at the meeting

Important advantage of the drug treatment is that the children do not have to be sent to an institution but can remain at home Even without their being moved from a bad environmental or psychological situation, their bad behavior was controlled or improved by the drug

The children studied by the Duke researchers did not have epilepsy nor was there any history of epilepsy in their families. The children did, however, have abnormal brain waves The scientists believe that their discovery of the abnormal brain waves and good response to dilantin in these problem children should have further study because of the possibility of preventing the problem behavior becoming something more serious

Hope for "Lost Weekenders"

➤ SOME DAY alcoholics may be able to use a treatment, somewhat like insulin for diabetics, that will keep them from having "lost weekends" This is a possibility that may result from research suggested by Dr J D Reichard, medical director of the U S Public Health Service at Lexington, Ky

The action of amphetamine, or benzedrine, known to the layman as "pep pills" which students took to keep awake while cramming for examinations, was specifically cited by Dr Reichard

This drug is familiar to psychiatrists for the sometimes successful and spectacular improvement of the mood of mental patients Dr Reichard did not suggest the use of amphetamine for alcoholics His idea, however, is that if a chemical can induce a change in mood and behavior of one type of mental patient, some other chemical might be found to change the mood and behavior of the alcholic

Search for this chemical to control alcoholism and other types of drug addiction as insulin controls diabetes must be based, he said, on a better understanding of normal anatomy, chemistry, physics and physiology as they are related to human feelings and behavior

"Cures" of alcoholism are not cures in the sense of the word applied to other diseases, he pointed out Cure of a disease ordinarily means that the ill person has recovered so completely he can resume his usual activities

"If," he said, "we actually could 'cure' a person addicted to alcohol who for years prior to addiction had been able to drink in moderation, we should expect him then to be able again to return to moderate drinking Such results of treatment are so uncommon as to be almost non-existent."

Remove Frustration

➤ A VERY serious chronic mental disease, schizophrenia, may be prevented in some cases by removing the frustration which threatens to unbalance the patient's mind

Case histories showing how this could be accomplished were presented at the meeting by Dr J M Nielson and Dr George N Thompson of Los Angeles County General Hospital

Immediate recovery followed removal of the frustration in some cases In one instance, the illness could be brought on again by simply reintroducing the frustrating situation

Frustration does not always lead to schizophrenia, nor is the illness always caused by frustration, the Los Angeles physicians pointed out They explained how frustration may lead to schizophrenia somewhat as follows

A state of anxiety results when a person, once frustrated, cannot accept defeat but continues to strive for the unattainable goal. Emotional depression, on the other hand, results when frustration is accepted as final, yet the desire for the unattainable goal continues without active pursuit of it When the depression comes to an end, they said, various forms of reaction may appear, depending on the make-up of the individual

These reactions include an attack, either verbal or physical, on the object or situation causing the frustration, sublimation of one's ambitions, or a psychotic response, that is, outright mental sickness Only a relatively small number, the doctors said, will develop a psychotic reaction, resembling schizophrenia. If the frustration is then overcome by direct assault or by sublimation before it becomes thoroughly established, complete recovery can be achieved If success is impossible a genuine schizophrenia may develop

Children suffering from the very severe mental sickness called schizophrenia actually have a better chance of getting well when treated at the doctor's office than when sent to a mental hospital, Dr J Louise Despert of New York Hospital finds.

Although the prospect of complete recovery remains doubtful, results of this treatment which allows the child to live at home with his family have been encouraging

Dr. Despert has tried the treatment on seven children ranging in age from three to seven years.

Science News Letter, June 8, 1946

SOCIOLOGY

Culture Theory Proposed

➤ A MODERNIZED theory of culture which embraces nearly all known civilization since the beginning of recorded time, excepting the Americas before Columbus, has been postulated by Prof A L Kroeber, anthropologist of the University of California

Prof. Kroeber models his concept after the Greek theory of culture, called Oikoumene, meaning "the inhabited," which was actually the Mediterranean basin This was all the inhabited world known to the Greeks

The concept proposed by Prof Kroeber holds that the known cultures of Europe and Asia form the parts of a whole pattern These cultures have all drawn upon what Prof Kroeber calls the root-stock of all higher civilizations

Thus, for example, sculpture is a cultural expression of a wide range of higher civilizations, in different periods of time in widely separated geographical areas. While this art was developed in different forms and to different degrees of perfection, sculpture is a part of the root-stock of higher civilizations, and is unlimited by time or geographical considerations. It was borrowed by the exchange of ideas for differential development

Prof Kroeber pointed out that the interrelations of the different known cultures are such that it is extremely difficult and in many cases impossible to determine when or where a cultural expression such as the domestication of animals and plants or the development of games of mental skill took place

The anthropologist said that his concept would involve a shifting of the Greek "Oikoumene," meaning from "range of mankind" to "range of man's most developed cultures," thus giving a significant designation to an interwoven set of happenings.

Prof Kroeber, speaking recently as Huxley Medalist before the Royal Anthropological Institute of Great Britain and Ireland, meeting in London, England, excluded the pre-Columbian Americas from his "Oikoumene" because there is no definite interrelationship between the cultures of the Americas and Eurasia during this time.

Prof. Kroeber's Oikoumene encompasses not the totality of the culture of all humanity at all periods and all places, but "as large a sector of it as the millennially interrelated higher civilizations in the connected mainland masses of the eastern hemisphere"

"The speed of diffusibility of culture content is so great under optimum conditions," Prof. Kroeber said, "that the period of half-a-dozen millenia which we have been considering would have sufficed for particular items—say something like smoking, or coffee—to have spread around the planet again and again and again

"What counts for total comprehension of the story of man's doings, however, is not these flashing meteoric bits, but the concatenated masses of culture and the interrelations of these

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"It is in connection with the understanding of major drifts such as these that the concept is here submitted of an Oikoumene consisting of a specific, preponderant, interwoven, definable mass of culture charged with a modern significance additional to the original socio-geographical designation in which culture reference was at best only implicit"

Of his reasons for excluding the Americas from his "Oikoumene," Prof Kroeber said "I would not deny that first and last a great many seeds of culture passed, by land or by sea, from Asia to this or that part of the Americas, and that some proportion of them germinated, or a least stimulated new growths on the soil Yet the story of major civilizational growth in America gives no indication of integrating with the corresponding story in Eurasia The two are not, so far as we can yet see, parts of a single plot"

Science News Letter, June 8, 1946

RADIO

Loran Guides Bombs

Radio navigation system can be used in the next war to guide bomb-carrying pilotless aircraft to the target thousands of miles away.

➤ THOUSANDS of bomb-carrying pilotless aircraft in the next war could be rained upon an enemy nation thousands of miles away through use of the radio navigation system called loran that was developed and used during the war

Dr J A Pierce, now at Harvard, who participated in the loran development at the MIT radiation laboratory, describes in a communication to the Institute of Radio Engineers a method that would allow all-weather flying bombs to be launched from hundreds of points and guided to their targets by an invisible net of precisely timed signals spread over the area attacked (*See* SNL, Feb 9, 1946)

"Since hyperbolic navigation does not call for the transmission of any information from the vehicle under control, it is a mechanism with vast potentialities for the two-dimensional guidance of automatic projectiles," Dr Pierce states

"If flying bombs are to become the all weather airforces, no other system offers such immediate possibilities for the mass control of very large numbers of projectiles Systems which require some contact between a projectile and a ground operator other than the launching crew, may well have many tactical uses in close support operation, but the possibility of maintaining the strategic bombardment by such method is remote

"A hyperbolically (or loran) controlled flight of pilotless aircraft, on the other hand, could be operated without any close cooperation between launching crews and the controlling group, and without saturation of the guiding facilities The receivers for hyperbolic operation of this sort would differ greatly from the present loran receivers The equipment for pilotless aircraft should be reduced to the stage where they know only a single time difference but know it well. A pair of ground stations would establish a line of position extending from the launching area to the target, while a second pair would define the intersecting line at which the projectiles would descend Under gyroscopic control the projectiles could be launched at any time and in any number, and the accuracy of their initial courses would need only to insure an intersection with the first hyperbolic line before passing the target"

Aircraft could be launched from many points in a large area Dozens or hundreds of launching sites would independently send off aircraft sensitive to a single line of position It would only be necessary to have the control system in operation These aircraft would follow their independent courses, perhaps for half the distance to the target, until they came within the zone of influence of the loran or hyperbolic lines Each would then change its course and come about to ride the line The effect would be that of raindrops falling into a gigantic funnel and being concentrated into a steady stream playing the target

"Such a stream of bombs would, of course, rapidly obliterate any objective," Dr Pierce explains "In practice, therefore, the ground station operators would steadily alter their timing constants so that the line followed by the projectiles would be caused to sweep back and forth over the target area, while the constants of the release line would be altered, perhaps in steps, to provide the requisite variations in range

"The stream could be played back and forth across the target area like the stream of a fire hose, or more exactly, like the stream of electrons scanning a television screen All this control could be exercised without any cooperation from the launching crews Like the loaders on a battleship, they would simply maintain the flow of projectiles without giving thought to their destination"

Science News Letter, June 8, 1946

MEDICINE

Baby's Life Saved by Removing 75% of Blood

➤ A BABY doomed to almost certain death at its birth less than a year ago is now alive and well because physicians dared to remove 75% of the blood in the tiny infant's body The story of this dramatic procedure which has now been carried out successfully on three desperately sick babies is told by Dr Harry Wallerstein of New York in a terse report to fellow scientists in their journal, *Science,* (May 10).

Each baby lived because during the same hour that 75% of its blood was being drawn from one vein, a somewhat greater amount of fresh blood was flowing into another vein

The reason for the procedure was that the baby in each case had inherited from its father the Rh positive blood factor while its mother had blood with the Rh negative factor When this happens the slight mixing of baby's and mother's blood before birth may bring into the unborn baby's veins a substance that destroys its blood cells. Sometimes this destruction is so great the baby dies at or before birth In other cases the baby may be born alive but jaundiced and sickly

Transfusions of Rh negative blood sometimes tide the baby over until the blood-cell-destroying substances are got rid of Because these transfusions do not always save the baby, Dr Wallerstein had the idea of getting rid of the harmful blood rapidly and of making it safe to do so by simultaneous transfusion of new blood.

A more widespread use of this method for saving babies born with the condition, called erythroblastosis fetalis, is justified, Dr. Wallerstein states, by his results.

Science News Letter, June 8, 1946

GEOPHYSICS

Drowned Archipelago

Numerous submerged flat-topped mountains have been located in the Pacific between Hawaii and the Marianas by means of echo-sounding apparatus.

➤ AMERICAN WARSHIPS, steaming westward from Honolulu to liberate the Philippines, passed right over a great drowned archipelago, existence of which had never before been suspected At the American Geophysical Union, in Washington, Prof H H Hess of Princeton University told how 160 submerged flat-topped peaks, rising from the ocean floor between Hawaii and the Marianas, had been discovered by means of echo-sounding apparatus carried by ships

The drowned mountains may have been a cluster of atolls, like the Marshalls, site of this summer's atom-bomb tests This is suggested by the flatness of their tops If the water were drained away from Bikini or one of its sister atolls, it would appear as a steep-sided mountain with a slightly raised rim around its flat top This rim is all that now appears above the water, as the islands and reefs of the atoll.

There is just one thing wrong with that theory, Prof Hess stated· these drowned mountains don't have any raised rims. On the contrary, there is a gently sloping shelf, like a beach, around most of them He advanced the tentative hypothesis that they are volcanoes that emerged from a very ancient sea, were planed off by wave action and subsequently immersed by the simultaneous sinking of the ocean floor and rising of the sea level He thinks that this may have occurred as far back as pre-Cambrian time—something more than half a billion years ago

Without question, this lost island empire will be made the locale of Atlantean romances as soon as fiction-writers hear about it Prof Hess, more practical-minded, merely suggested more thorough sounding and more complete charting of the area.

Speaking for a committee on the study of ocean basins, of which he is chairman, Prof Hess strongly urged a program of deep drilling on Pacific atolls. How these curious ring-shaped islands came into being has been the subject of speculation and discussion ever since Charles Darwin proposed the first scientific theory, more than a hundred years ago But so far no one has undertaken to find out actual facts by boring a few deep holes

Prof Hess also announced the forthcoming publication by the Hydrographic Office, U S Navy, of a detailed chart of the ocean bottom in the western Pacific area, covering the area from Japan to northern New Guinea and including the Marianas, the Western Carolines and the Philippines This has been made possible by the tens of thousands of echo-soundings recorded by cruising Navy vessels during the war Similar bathymetric charts for the areas from New Guinea to New Zealand and from Hawaii to the Marianas are also in prospect

It's Been Getting Warmer

➤ WHEN THE present generation of youngsters get to be oldsters they may be able to tell their grandchildren that "summers were lots hotter when Grandpa was a boy" Since the 1870's, winters have been growing milder and summers hotter, J. B. Kincer, veteran of many years' service with the U S Weather Bureau, reported to the meeting However, he added, there are indications that a reversal of the trend is about to take place

Mr Kincer's exhaustive statistical analyses of weather records from all over the country show this to be true not only of average temperatures but also of extremes For example, days with temperatures of 90 degrees Fahrenheit or higher in Washington's notoriously uncomfortable summers averaged 34 per year for the 20 years ending 1945, whereas for a 20-year period ending 1907 there were on the average only 19 days per year. On the other hand, days when the thermometer failed to rise above freezing point (which is really cold weather for Washington) were less numerous in the recent period than in the earlier one an average of 11 as against 17.

Mr. Kincer believes that studies of this kind may have some value in efforts towards long-range weather forecasting, provided too great demands are not made of them They are valuable, he said, "in affording an indication of expectancies or probabilities of future weather beyond the range of standard synoptic forecasting"

Waves Can Outrun Wind

➤ "SWIFTER than the wind" is literally true of some ocean waves, reported Dr H U Sverdrup, director of the Scripps Institution of Oceanography With W H Munk, he has been making a study of wave behavior with relation to the wind, some of their results were of great value in naval operations and beach-head seizures during the war

Wind can start and speed up waves in two ways, Dr Sverdrup stated One way is by direct push at the water surface This in itself would never generate waves able to outrun the wind that raised them However, there is a second effect of the wind "brushing over" the surface of the water and creating drag, or skin friction With this added impetus, waves take on additional speed and sometimes literally run away from the wind

How earthquake-recording instruments can be used in locating and forecasting the movements of storms at sea was told by Marion H Gilmore, director of hurricane microseismic research for the Navy

Instruments Place Storms

➤ IT HAS been amply demonstrated that slight tremors in the earth's crust—mere ripples as compared to earthquake waves—are set in motion by storms, especially by violent storms of the hurricane type By close study of the shapes of the "squiggles" that appear on the seismograph record, it is possible to tell how far off the storm is, and by coordinating the data of two or more stations it is possible to tell exactly where it is, and how fast and in what direction it is moving

It used to be conjectured that "microseisms" were caused by the battering of huge waves on the shore However, the studies demonstrated that the tremblings are started on the ocean bottom, right under the storm center itself. How the energy of the wind is transmitted through the water and into the rocky crust underlying the ocean has not yet been determined

PSYCHOLOGY

Atom Control Psychology

Five-point program presented to atomic scientists by psychologists urges the nation to combat fear of atomic energy by stopping atom bomb manufacture.

➤ PSYCHOLOGISTS have presented the atomic scientists and the nation with a five-point program for the psychological control of the atomic energy problem·

1. The atomic bomb danger must be understood by everybody

2 The promise of peaceful use of atomic energy must be emphasized

3 An effective civilian control of atomic energy must be instituted in our country.

4 International control must be an immediate next step.

5 We must stop making atomic bombs immediately.

"No atomic bomb can declare war," the statement issued adds, "only man can do that"

"The fear that the atomic bomb has created can and must be dispelled by cooperative social endeavor," it is further stated in the pronouncement prepared for the Association of Atomic Scientists by the Society for the Psychological Study of Social Issues, a division of the American Psychological Association

Its committee on international peace, of which Dr David Krech of Swarthmore College is chairman, suggests that everyone should be made aware that there is no military defense against the horrors of the atomic bomb The real danger is the possibility of another war The atmosphere of demoralizing fear of atomic energy can be reduced by presenting atomic energy facts in honest, unexaggerated peacetime terms

Suspicion of military use of atomic energy, the statement says, can be laid to rest by a program of civilian control with public proceedings of the civilian commission Positive assurance should be given now, it is urged, that we will cooperate in international control when it is set up along lines of the recent State Department report.

The manufacture of atomic armaments should be discontinued immediately, it is recommended, and this should be announced in unequivocal words to our citizens and the world

"Psychologists know that a vague fear in an individual soon leads to a sick individual," the statement says "This vague fear spreads and influences all his thinking If we become victims of such a fear we will soon begin to suspect and distrust every other country, every international proposal, every move. We will frantically take every imaginable precaution against this unknown danger

"We will accept the suppression of freedom of speech, of freedom of research, of freedom of criticism in our country, because in our panic we will not know whom to trust nor whom to believe And like the sick patient ridden by an ill-understood fear, we will see threats to our safety everywhere We will therefore support a national policy of universal conscription, militarism, and political isolation This sick and distorted thinking is just the mental preparation which sets the stage for international conflict and violence"

Science News Letter, June 8, 1946

MEDICINE

Diabetics May Be Told To Stop Smoking

➤ DOCTORS WILL soon be telling their diabetic patients not to smoke, if they follow the warning that appears, without being stated, in a report by Dr. Leonard A Weinroth and Dr. Joseph Herzstein of Mount Sinai Hospital, New York City (*Journal, American Medical Association,* May 18).

Blood-vessel disease of a kind that incapacitates the patient with pain and weakness in his feet and legs so that he cannot walk or that leads to ulcers and gangrene afflicted significantly more smokers than nonsmokers in a group of 301 diabetic men, these doctors found.

The conditions were present in 126 of the 218 smokers but in only 31 of the 83 nonsmokers This "penalty" was paid by smokers regardless of how long they had diabetes, how severe the diabetes was, how well it was controlled by diet and insulin and whether they were overweight or had high blood pressure

The way in which smoking might cause the blood vessel disease in diabetics is not clear, the doctors state They suggest that a patient whose blood vessels are already constricted and hardened may have them further constricted by tobacco smoking, which is known to have this effect This would favor formation of blood clots which would stop blood circulation to the feet and legs and lead to the pain, ulcers and gangrene

Science News Letter, June 8, 1946

ELECTRONICS

Mariner's Pathfinder Is Simplified Radar

➤ A MARINER'S pathfinder is among the new interesting instruments recently shown at the National Marine Exposition in New York

It is a dependable and rugged commercial radar equipment developed for the merchant marine, the principal feature of which is, perhaps, its simplicity.

The new surface search radar equipment is based upon experience in wartime designs and production, but is unusually flexible in installation and gives maximum performance, the makers claim It was designed and constructed by the Raytheon Manufacturing Company of Waltham, Mass. It operates within the band of frequencies allocated by the Federal Communications Commission for commercial radar, and provides reliable and early warning of dangers ahead.

The pathfinder is divided into three major components indicator, transmitter-receiver, and antenna The indicator is box-shaped and less than 15 inches square, and two feet deep. It is mounted on a pedestal, or bracketed from the bulkhead or the overhead On its face is a seven-inch plan position indicator or polar chart, which is normally oriented with respect to the ship's bow. Only seven controls are required on the indicator panel.

The antenna is a seven-foot parabolic reflector of slatted construction to minimize wind resistance It weighs less than 150 pounds and may be mounted on top of the mast to provide maximum view The transmitter-receiver houses all necessary system units and provides for accessory mounting when required Power transmission to the antenna is by means of low-loss coaxial cable when desired

Science News Letter, June 8, 1946

House *centipedes* are beneficial because they feed on flies, bedbugs, roaches and other household insects.

ENTOMOLOGY

Giant Polyphemus Lives For Only One Purpose

See Front Cover

➤ THE POLYPHEMUS moth is one of our largest and most beautiful silk-spinning moths The photograph by George A Smith, on the front cover of this SCIENCE NEWS LETTER, shows the beauty and detail of this giant moth It is found from the Atlantic to the Pacific Its wings, which often reach a span of four inches, are delicately marked with shades of ochre, brown and blue There is a distinct eye-like spot in each wing The polyphemus never eats during its lifetime, which is only a few days Its only mission seems to be that of finding a mate and depositing its eggs in order that its race will be continued

Science News Letter, June 8, 1946

PSYCHIATRY

Nervous? Time Off from Job May Be Bad Advice

➤ TELLING a "nervous" patient to take time off from his job may be the worst advice a doctor can give. If the advice is followed the patient may become a chronic mental patient, Dr. Frederick W Dershimer, director of psychiatry for E I. du Pont deNemours & Company, warned at the meeting in Chicago of the American Psychiatric Association

Employers and the public as well as employees may suffer if workers with nervous and mental disease are too rigidly eliminated from industry, he pointed out

"Before we decide to screen them out," he said, referring to such cases, "we need to give serious consideration to the fact that the inventor of nylon was a known psychiatric case for years. Denying employment to him would have cost the du Pont Company more than the psychiatrist could hope to save in a lifetime."

Many patients suffering from severe psychoneuroses and some with psychoses, which are more serious forms of mental sickness, can be treated without leave of absence, Dr Dershimer has found. By doing so, better and quicker results can be obtained than when sick leave is granted.

Psychiatrists going into industrial work need to learn everything possible about the organization and healthy functioning of the particular company where they work, Dr Dershimer stated Without this basic knowledge psychiatrists in the past have offered remedies for nonexistent ills and completely missed important problems they might have helped to solve

"Tall tales" of job hazards told to new workers by the old hands sometimes lead the newcomers to work in a state of chronic terror Other traits and habits of the American workman may cause or make worse some psychiatric problems Unless the company psychiatrist is familiar with such conditions he cannot help the workers

Science News Letter, June 8, 1946

INVENTION

Liquids Dehydrated Into Powder Form

➤ THREE PATENTS, Nos 2,400,458 to 2,400,460, have been issued to Joseph M Hall of Chicago on apparatus for dehydrating liquids such as fruits and vegetable juices into powder form. The liquid is fed into the drying chamber through a rotating hollow shaft which ends in a set of whirling spray nozzles, so that the liquid is thrown out in minute droplets. As these tend to fall towards the bottom of the big, top-shaped drying chamber they are met by a rising current of hot air, which removes the water As planned by Mr Hall, the dehydration is a two-stage process, the liquid being concentrated in the first drying chamber, and the concentrate reduced to final dryness in the second

Rights in the patent are assigned to the Drying and Concentrating Company

Science News Letter, June 8, 1946

GENERAL SCIENCE

Postwar Research Grants Of $175,000 Announced

➤ POSTWAR research grants to 28 universities and colleges providing $175,000 for investigations in many fields of physics and chemistry were announced by Dr Joseph W. Barker, president of the Research Corporation

Such special grants, named in honor of Dr Frederick Gardner Cottrell, whose gift of patent rights in electrical precipitation in 1912 inaugurated the foundation, will total $2,500,000 in the next five years. They are intended to aid the return to their educational institutions of faculty members in war research.

Science News Letter, June 8, 1946

IN SCIEN

AERONAUTICS-ENGINEERING

Gas Turbine Engines for English Passenger Planes

➤ FOUR GIANT planes for the North Atlantic route, each to accommodate 180 seated passengers, have been authorized by the British government and three of them will be powered by gas turbines The first, already in an advanced stage of construction, will be powered by conventional engines.

One of these eight-engined 110-ton planes, all to be known as Brabazon 1, will be ready for use within a year, its builder, the Bristol Aeroplane Company, expects The first of those powered with gas-turbine units will be ready a year later. The Brabazon 1 will have a wing span of 230 feet Fitted with sleeping berths, the new planes will accommodate 80 passengers.

Science News Letter, June 8, 1946

MEDICINE

If You Have a Cold, Don't Exercise

➤ EXERCISE IS bad for the common cold, contrary to some conceptions that a sweat will eliminate the ailment

This is reported by Dr Franklin Henry, assistant professor of physical education at the University of California, on the basis of experiments in which he tested 21 students both under conditions of good health and in the stages of an active cold

Dr Henry found that a person puts forth more effort when exercising with a cold than he does when in good health

He said that while there is no significant difference in blood pressure or pulse rate, breathing performance for 15 seconds after exercise was significantly poorer in persons suffering from colds

Dr Henry also found, by analysis of the last bit of expired air after exercise, that there was a greater accumulation of carbon dioxide in the blood streams of persons with colds He said this was probably due to a reduction in the individual's alkaline reserve, resulting in temporary hyperacidity in persons taking exercise with colds.

Science News Letter, June 8, 1946

E FIELDS

PLANT PHYSIOLOGY

Signal Growth Potential Soaked Corn Grains

➤ CORN GRAINS, after soaking in water for a while, can give electrical signals telling how likely they are to sprout if planted, and what kind of yield can be expected from the stalks that will grow from them How this is done is told by two Yale scientists, Dr Oliver E Nelson and Dr H S. Burr, in the *Proceedings of the National Academy of Sciences,* (April 15)

Soaked corn grains, they explain, have an electrical potential, and this can be registered by touching suitable electrodes to their opposite ends and leading the minute current thus released to a sufficiently sensitive galvanometer

First readings made in this way were found to be correlated with the viability of the seed, that is, its power to sprout and grow if planted. If this connection is maintained for a time, the first potential drops somewhat and levels off A second potential reading, made after this period of stabilization, has been found to be correlated with the weight of grain subsequently harvested from the cornstalk produced by that seed. Various hybrid corn strains show distinctive electrical potentials, the two investigators state

Science News Letter, June 8, 1946

MEDICINE

Direct Record of Human Heart Action Obtainable

➤ BY INSERTING a fine wire into an elbow vein and gently pushing it forward until its tip rests inside the heart or against its walls and connecting the other end to a recording galvanometer, doctors can now get a direct record of the electrical currents of human heart action, Dr H H. Hecht, of the University of Utah Medical School, reported at the meeting of the American Federation for Clinical Research in Atlantic City

None of the volunteers, some of whom had heart disease, were harmed by the procedure and none complained of unusual sensations, Dr Hecht stated.

The location of the impulses which govern the heart beat could be shown for the first time with this procedure They start in a section of the right side of the heart, and then spread over the human heart muscle in a well defined manner quite similar to the spread of impulses seen in open chest experiments performed on dogs and monkeys in both normal and abnormal conditions

The electrical currents of heart action have been recorded for many years in human subjects and these electrocardiograms have been extensively used in diagnosis of heart and blood vessel disease, Dr. Hecht pointed out However, no direct records from the human heart have been available The significance of the electrocardiogram has been interpreted by analogy with information gained from experiments on strips cut from heart muscle, skeletal muscle or nerve tissue

The direct records Dr Hecht obtained show that the electrical phenomena associated with the heart beat in man are almost identical with those that can be obtained from the highly artificial nerve strip or muscle preparation Doctors can therefore continue to use the electrocardiogram for patients, while the new technique is used to gain additional information about heart action.

Science News Letter, June 8, 1946

PSYCHIATRY

Juvenile Delinquents Are Neurotics

➤ JUVENILE delinquents are neurotic persons with unresolved conflicts and unconscious drives for which they are not responsible, Dr Leonard M. Dub, of Washington, D C., declared at the meeting of the American Psychiatric Association in Chicago

Trying to reform them by, for example, teaching them that it is wrong to steal an auto for a joy-ride and that they should find something legitimate to do when they want to have fun does not help because it only touches the surface of their neurotic minds

The real cause of the auto-stealing or other delinquent behavior lies much deeper and involves a problem of which the juvenile delinquent is not aware.

Sending such a young person to prison or reform school is almost pointless, Dr. Dub said, unless he is helped by a psychiatrist to understand and unravel the twisted threads of his own individual experience with life so that he can change not just his conscious motives for behavior but his whole attitude toward life

Science News Letter, June 8, 1946

ACOUSTICS

New Instrument Imitates Any Musical Sound

➤ AN INSTRUMENT that can reproduce not only the sound of a piano but the tone of any individual piano or any other musical instrument is not going to be used in a symphony orchestra It will stay in a scientific laboratory

The instrument is a hundred-element tone synthesizer demonstrated to the Acoustical Society of America by E C Wente, C A Lovell and J F Muller of the Bell Telephone Laboratories, Murray Hill, N J

One hundred magnetic records placed side by side on a rotating drum produce sine-wave currents to generate a complex electric current Special circuits adjust the build-up and decay rates of groups of components to simulate the sound of musical instruments

Science News Letter, June 8, 1946

GEOLOGY

Paricutin Affords Chance To Study Soil Erosion

➤ PARICUTIN, Mexico's three-year-old volcano, not only affords scientists opportunity to study the early stages of a volcano's life history; it also offers an unparalleled chance to observe soil erosion in the raw What water and wind are doing to the thick mantle of ash which Paricutin spread over 140 square miles of Mexican farms and forests was described and pictured by Dr W C Lowdermilk of the U S Soil Conservation Service, before the meeting of the American Geophysical Union

The volcanic ash is for the most part very fine and loose, and since there is no vegetation on it as yet it is washed away very easily, forming gullies that grow wider and deeper Streams flowing down these gullies immediately after a storm consist of a gruel-like mud rather than water, in samples collected at various times, volcanic ash constituted from 40 to 60% of the total weight

Large boulders that would sink in water will float on the fluid mud Stones are often found in the middle of fields after a mud-flood has swept over them.

Yet this mantle of volcanic ash is not an unmixed curse. If modern plows and tractors can be got into the region, to bring the buried soil up and mix it with the ash, the fertility of the fields will be greatly enhanced

Science News Letter, June 8, 1946

BOTANY-CHEMISTRY

Chemical War on Weeds

2,4-D, another wartime product, is being used as a household agent against weeds. It kills practically all plants except grasses, so don't get it on the flowers.

By DR. FRANK THONE

➤ CHEMICAL WARFARE against weeds has been launched on a huge scale this spring From coast to coast, whole armies of householders are enthusiastically pumping their spray-guns, dealing death to dandelions that have long made occupied territory of their lawns Along with the dandelions, plantain, purslane, chickweed, wild garlic and many other disfigurers of green turf are curling up and quitting, under the deadly mist of 2,4-D

That symbol, 2,4-D, has suddenly become as much a household word as the equally sensational bane to bugs, DDT Like DDT, it is a synthetic organic chemical—its full name is 2-4-dichlorophenoxyacetic acid And like DDT, it is a war baby, and is only now getting out of uniform

The great virtue of 2,4-D is what plant scientists call its selective action It will kill almost any plant except members of the grass family and their near relatives, such as sedges and rushes That is what makes it so useful on lawns, golfing fairways and putting greens, and everywhere that you want grass and nothing else It can also be used on weedy pastures, where such bad citizens of the plant world as ragweed and jimson weed have taken over

Selective action of 2,4-D is not absolute A few weeds resist it, and a few desirable grasses are harmed by it This is especially true of the bent grasses, favorites for lawn and park planting in some localities. However, blue-grass, which is what most lawns are made of, can stand repeated spraying without harm

Kills Weeds but Not Corn

Another possible use for 2,4-D is killing cornfield weeds and eradicating such pests as wild mustard from fields of small grains; for all our grain crops are members of the grass family, so that the selective action of the weed-killer should work here, too Preliminary experiments last year looked promising, and more extensive tests will be made this year by federal and state agronomists Results with sugarcane (another giant grass) have already proved conclusive Cane planters are enthusiastic

For mass killing of rank weed growths like poison ivy, Japanese honeysuckle and bindweed or wild morning-glory, 2,4-D looks like a first class weapon To be sure, it has to be used in stronger concentration to kill these tough vegetable thugs, and more than one spraying will be necessary, but it will get them in the end

For uses of this kind, where everything in sight is to be killed, 2,4-D will have to meet the competition of another weed killer, ammonium sulfamate This compound was hailed as the white hope against weeds when it made its first appearance about four years ago, but since it is also a good flameproofing material the whole available supply was needed for war purposes It was not until after the collapse of the Axis that it became available for civilian purposes. It got a good enough try-out last year, however, to demonstrate its effectiveness

Replace Old Weed Killers

Either 2,4-D or ammonium sulfamate, whichever proves cheapest to use, is likely to replace the older mass weed killers, like oil and sodium chlorate These had to be used in considerable quantity to be effective, and both presented rather bad fire risks Sodium chlorate, indeed, is used in some kinds of explosives and fire-works Dead weed leaves with this stuff dried on them can flash into flame like lightning at the touch of an unextinguished match or cigaret

Tests with 2,4-D last summer showed that it could neutralize ragweed's power to cause hayfever by preventing it from shedding its pollen By the same token, it would also prevent ragweed from perpetuating its evil kind, for both the common species of ragweeds are annuals, depending on seed for the next year's



BEFORE AND AFTER—What one of the new herbicides will do to poison ivy, one of our wickedest weeds, is well shown in this pair of pictures. The picture on the left shows the homemaker spraying the poison ivy, and the other shows the weed as it looked a couple of weeks later. In this instance the chemical used was ammonium sulfamate; 2,4-D would do the job just as effectively.

growth. Some ragweed seed always lies dormant in the soil, ready to come up not one but three or four years after it is produced. However, successive sprayings of the same patch could exhaust these vital reserves in a few seasons.

Kills Seeds in Soil

Another possible tactic employing 2,4-D is its use in killing weed seeds in fallow fields, before the soil is made ready for a new planting. Tests showed that 2,4-D stirred into the upper layer of the soil would clean out all seeds, including grass seeds. It did the same thing when mixed with manure, which is often a source of weed seed when used for fertilizer.

Yet soil thus treated, as well as the soil under grass that has been sprayed, does not long hold its 2,4-D content. After a few months it has all disappeared, so that it is safe to plant any kind of seed you wish, even of highly sensitive vegetables and flowers.

What becomes of 2,4-D in the soil? Nobody knows yet, the whole thing is too new. Scientists conjecture that it may be made chemically inert by combination with substances in the soil, or (perhaps more likely) that fungi, which are everywhere and apparently ready to eat anything, may use it up for food. At any rate, it does obligingly get out of the way before next planting time.

Non-Poisonous to Animals

Another nice thing about 2,4-D is it is non-poisonous to human beings and domestic animals. It was tried out on cows and ewes, and had no detectable effect at all on them. Samples of blood drawn from their veins showed its presence, but it did not get into their milk. Also, some hardy scientists swallowed samples of it, and felt no ill effects afterwards.

Just now, 2,4-D is getting practically all the attention, but it is only one member of a very large chemical family. It has about a hundred fairly close relatives among organic compounds, all of which are known to have effects on plant growth. Probably many of them could be used as weed killers also, and some may be even more effective than 2,4-D.

It should be remembered that 2,4-D is not like other plant poisons in its action. It belongs to the group of chemicals that in small doses cause more rapid growth but otherwise leave the plants normal. In the heavier concentrations used as weed killers it promotes a wild and unhealthy overgrowth of the tissues, causing the leaves to pucker and twist and breaking down all internal communications. The plant acts almost as if it had suddenly become tumorous all over, and it dies of sheer inability to make its parts work together properly.

Don't Use on Flowers

If the householder using 2,4-D in his private feud with the weeds in his own yard will remember just one thing, he will not have any trouble. That is the initial fact that 2,4-D will kill practically all plants except grass. It can therefore be used to clean up the lawn, but must never be used on weeds in vegetable or flower gardens.

If you want to use the same sprayer for 2,4-D on your lawn and for insect pests in your garden, you must make sure it is thoroughly cleaned up before putting in the insecticide. All parts of the sprayer must be well washed in hot soapsuds, or better yet, in kerosene.

Don't spray your lawn when there's a breeze stirring. If you do, some of the fine spray may drift onto your flower beds or shrub borders, with unfortunate consequences. If it gets on your neighbor's flowers or shrubs, that's even worse.

Do your spraying only on warm days, temperatures around 80 or 85 degrees Fahrenheit are best. Effects of the poison are best when the weeds' sap is moving most actively, so that it will be carried to the inner tissues and down to the root, getting in its deadly work all over.

In its pure form, 2,4-D is a white powder, practically insoluble in water. To make a water spray, it is necessary first to dissolve it in another chemical, and then mix this with water. It is in this dissolved form that 2,4-D is now offered on the market, under trade-names such as Weedone, Weedex, and the like. When this is mixed with water it still does not dissolve, but forms a milky emulsion which is a very good state for maximum distribution with a sprayer.

Tiny Drops Most Effective

Another thing to be remembered is, the finer the spray, the more effective the spraying. This is because tiny drops, like the water droplets in a thick fog or Scotch mist, have much more wetting effect than larger ones. So if you are buying a new spraygun, the best economy is to get the one that produces the finest spray. In that way, you'll get the most dead dandelions per dollar's worth of 2,4-D.

Science News Letter, June 8, 1946

PSYCHIATRY

Jap Prisoners Suffer Long-Lasting Handicap

➤ BRUTALITIES suffered in Japanese prison camps have had a long-lasting handicapping effect on the personalities of even those with the healthiest make-up before the experience, reported Maj. Stewart Wolf and Lt. Col. Herbert S. Ripley, Jr., of the Army's Ninth General Hospital at the meeting of the American Psychiatric Association.

None of those heard from a year after repatriation are "really well and happy and effectively engaged in a suitable job," although several are carrying on "adequately in productive capacities," the Army medical officers reported.

All of those who answered questionnaires sent out by the doctors stated they had become less trusting of their fellows than before. Most of them reported optimism out of keeping with their handicaps and difficulties of adjustment to peacetime life.

Science News Letter, June 8, 1946

PUBLIC HEALTH

"Living" War Memorials Would Aid Handicapped

➤ "LIVING" war memorials in the form of centers for rehabilitating handicapped individuals are suggested as a community project to honor war heroes.

The Baruch Committee on Physical Medicine declares that helping the handicapped to become employable is cheaper than supporting such persons and their families on local assistance rolls, and that much needed hospital space could be freed by a rehabilitation project.

Not only city rehabilitation centers, but also mobile consultant clinics comparable to those used for cancer and crippled children programs are urged by the report to help all disabled individuals.

Some of the activities suggested for the "living" war memorials include physical medicine, psycho-social adjustment, vocational guidance, special education for the handicapped, a sheltered workshop, brace and limb shop, research in rehabilitation and an industrial placement program.

Once established, the committee says that such centers could be relatively self-supporting with funds from private patients, the Veterans Administration, state rehabilitation programs, industry and insurance companies.

Science News Letter, June 8, 1946

Do You Know?

The disease known as *latent mosaic* in potato plants usually has little effect on the appearance of the plant but may cut the yield 20% or less

Over 90% of British Honduras, Central America, is *forested,* some of the forests, however, cannot be made profitable. Mahogany, pine, rosewood and cedar are the principal timber woods

Grog to a sailor is rum weakened with water, its name is said to have originated with sailors because the first dilution was ordered by an English admiral called "Old Grog" who always wore grogram breeches

Germans built 10 *helicopters* before their manufacturing plant was bombed out by the Allies, postwar investigations show, the rotor craft could climb 1000 feet a minute with 10 passengers and a load of fuel.

Organic chemicals, called wetting agents, are mixed with water to control dust from coal and other solids that have water-repellent properties which making wetting difficult, also the agents decrease the high surface tension of plain water

Without the *forests* of Japan, its agricultural lands would soon wash away, the vast timberlands on the rugged slopes of hills and mountains hold the waters from rain and snow, preventing floods and erosion

Between 40% and 50% of all *children* contract whooping cough before the fifth year

THE SCIENTIST IN ACTION
by W. H. GEORGE
A SCIENTIFIC STUDY OF HIS METHODS
This book is for those who need to do ORIGINAL thinking, CLEAR thinking, THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.
H G WELLS Writes To The Author " I took up your book about a quarter to eight At nine my parlour maid came to ask if I wanted any dinner tonight. It is now close on to midnight. But I realize now that your book is of the UTMOST IMPORTANCE and I feel tremendously let up by it . . " Most respectfully yours, H. G. Wells
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MEDICINE

Stomach Ulcer Sufferers Are Dependent Type

➤ MEN WITH stomach ulcers, no matter how aggressive they may be, all suffer from a thwarted desire to be dependent on someone else, Drs Frederic T Kapp, Milton Rosenbaum and John Romano, of the University of Cincinnati College of Medicine, found from a study of 20 ulcer patients ranging in age from 17 to 54 years

Some of the patients were outwardly independent, hard-driving and successful, following the usually accepted type of ulcer personality. But the behavior of these go-getters was only an excessive compensation for deeply repressed longing to depend on someone.

A second group of patients, fairly successful men, were outwardly meek, shy and effeminate. They were partly conscious of their dependent longings and openly depended on a mother or wife but at the same time made a partial effort at masculinity and independence

The final and largest group in the 20 patients studied openly indulged their strong dependent desires. Chronic alcoholics and others with severe character disorders, bordering on the psychopathic, were included in this group

Science News Letter, June 8, 1946

CHEMISTRY

New Process Polishes Silver While Coating

➤ SILVERWARE CAN now be both plated and polished while still in the electroplating bath where the silver coating is applied It is a new process, discovered by a Westinghouse scientist When taken from the bath the object plated has the luster that housewives demand; no buffing is needed to give the required polish

It is an important discovery to all manufacturers of silver-plated objects because it saves material, time and cost In the conventional silver-plating process, the object when silver-coated and removed from the bath has no luster and must be buffed by hand on a revolving wheel Much silver is lost by abrasion and extra handling is required

In the new process, the objects to be plated are immersed in the usual silver cyanide bath and the negative current, that causes the deposit of silver, is sent through. This negative current, however, is interrupted by intermittent positive charges, and these cause the luster. The positive current, of about four times the amperage used to plate the metal, is applied for a few seconds, discontinued, and sent through several times again Any silver removed by the positive current remains in the bath

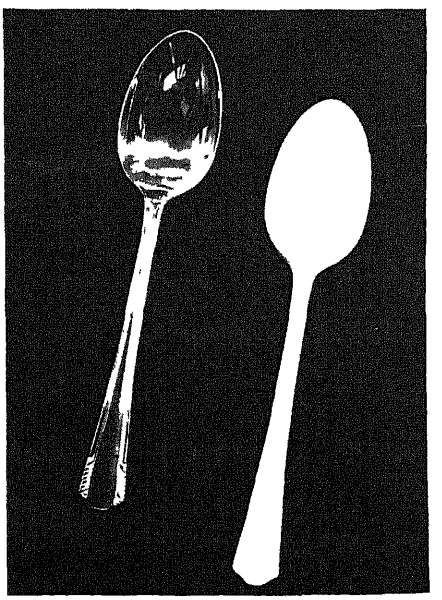
Science News Letter, June 8, 1946

Drafts, sudden temperature drops, sex, age, and working posture all determine the number and severity of *colds* a person may have

Honey is formed from the nectar of flowers after chemical changes take place when the bee mixes it with juices in its stomach

Antu, one of the new efficient rat poisons, is chemically alpha naphthyl thiourea, and is particularly effective in killing Norway rats, the common kind found in American towns and farms

The dangerous age for young *pedestrians* from motor vehicles is from four to six, youths of 17 are the principal juvenile victims of motor-vehicle fatalities affecting drivers and passengers



ONE OPERATION—The teaspoon on the right has been silver plated but not polished. The other has undergone the new-born electro-polishing process perfected by a physicist in the Westinghouse Research Laboratories. The new method may supersede the burnishing of silver plate by mechanical buffing. The transformation takes a little more than a minute.

PSYCHIATRY

Feeblemindedness

Is sporadic and not necessarily associated with family traits. New ideas are replacing some old beliefs about heredity and mental disease.

➤ OLD IDEAS on the heredity of mental disease were reversed in a report by Dr Abraham Myerson of Boston at the meeting of the American Psychiatric Association in Chicago

Feeblemindedness, he reported finding from a study of 47 cases, tends to be sporadic and not greatly associated with family feeblemindedness, as previously held

"It is time," Dr Myerson declared, "that the whole concept of feeblemindedness as occurring in many members of the same group and persisting for generations was thrust into the limbo of the forgotten and misleading"

Schizophrenia, on the other hand, he believes from his study may occur in the families of at least half the patients with this serious mental disease He found definite family mental disease in 23% of the patients under his care.

Again differing from orthodox psychiatric teaching, he reported finding environmental factors much more directly responsible for epilepsy than constitutional factors

In the depressive states he found such an appallingly large proportion of mental disease in the families of patients that he considers it a trend of great importance to the human race

He recommended establishment of a national institute for the study of heredity in mental disease After 50 years of compiling pertinent facts he believes results will be obtained either justifying drastic national action to remedy the situation or showing that constitution and heredity play little or no part in causing mental disease.

The theory of schizophrenia being hereditary in nature was further upheld by Dr Franz J Kallmann of the New York State Psychiatric Institute and Hospital

Predisposition to schizophrenia, he believes from a study of the disease in twins and others with close family relationships, depends on the presence of a specific genetic factor This explains why the disease occurs in a particular member of a family at a particular time.

This theory, however, does not in Dr Kallmann's opinion contradict current psychiatric belief that the disease can be prevented as well as cured

Follow Hereditary Pattern

Brain waves in patients with certain kinds of mental disease also follow hereditary patterns, state Dr Jacques S Gottlieb, M. C Ashby and John R Knott, of the Iowa State Psychopathic Hospital and the State University of Iowa College of Medicine.

Brain wave patterns of 35 patients with either primary behavior disorders or psychopathic personality, these scientists found, showed a highly significant relationship to the combination of the brain wave records of their respective parents

Abnormal brain wave patterns were found in 78% of children whose parents had abnormal brain waves, but in only 31% of children of parents with normal brain wave patterns

Heredity has previously been shown to be a determining factor in the brain wave abnormality found in epilepsy, they pointed out

Is Epilepsy Hereditary?

➤ THE CHANCE that a child of an average epileptic will have epilepsy is one in 40, Dr. William G. Lennox of Harvard Medical School declared.

Epilepsy is not directly inherited but predisposition to it may be transmitted, he said

The hereditary influence in epilepsy is about equal to that in diabetes, one-half that in obesity (overweight), and one-eighth that in migraine, he calculated from a study of the family history of 2,000 patients and the personal history of 45 pairs of twins affected by seizures

Strikingly good results in some patients with epilepsy have been obtained by treatment with a drug called tridione, Dr Lennox and Dr Harry L. Kozol stated

This drug was announced to the medical world in the *Journal of the American Medical Association* last December (*See* SNL, Dec 22, 1945)

The drug has not been used long enough, the doctors said, to warrant any statement about its long-term effects Encouraging is the fact that in patients helped by it, brain waves also become normal

Science News Letter, June 8, 1946

CHEMISTRY

Fire Retardant Property Of Paint Improved

➤ ALUMINUM POWDER added to priming coats improves the fire retardant properties of paint used in the interior of naval ships, Navy experience shows The mixture used is obtained by adding 80% aluminum paste to the primer in the proportion of one pound of the paste to two of the primer.

Science News Letter, June 8, 1946

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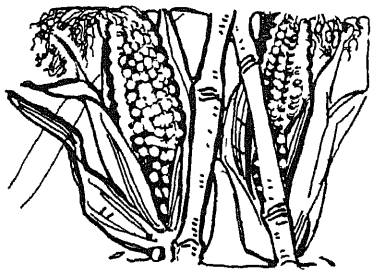
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GENETICS

NATURE RAMBLINGS by Frank Thone



Mendel's Bequest

➤ HENRY WALLACE declared a short time ago, during a visit to the Mendel museum at Mary Washington College, that Gregor Mendel did much toward the winning of the war, although he has been dead for several decades As explanation, he pointed out the great increase in the corn crop made possible by the planting of hybrid corn, which in turn was made possible through the practical application of the basic principles of heredity which Mendel had discovered.

It is not quite fifty years since Mendel's original papers were rescued from the generation of obscurity in which they had been buried during his later lifetime It is just forty years since Prof George Shull of Princeton made the last planting of his experimental strains of hybrid corn It is only a little over twenty years since Henry Wallace began his campaign to persuade farmers to stop merely selecting open-pollinated seed-corn ears for "prettiness" and begin growing hybrid corn for profit

At that time he expressed his belief in the ability of hybrid corn to boost the per-acre yield by as much as ten per cent This was a most cautious, conservative estimate, present-day figures show that the increase has been at least double that This means more corn for less work, it also permits sloping fields to be changed from plowland to pasture, at once checking erosion and increasing supplies of milk and meat So it is not at all far-fetched to assert that a long-dead Austrian monk helped America toward victory

Corn is perhaps the most conspicuous of crop plants that has benefited by the application of the Mendelian principles, but is is by no means a solitary example. On the contrary, it is quite safe to say that there is no grain, or garden vegetable, or fruit, or fiber plant, or domestic animal that is not receiving attention from breeders who follow the lines originally laid down by Mendel nearly two generations ago The method is even used to produce hybrid strains of forest trees, to give us quicker and bigger yields of timber and wood pulp

Mendel was a European His discovery has had its greatest development, in both theory and practice, in America The chaos of the postwar world gives American science its opportunity to pay an old debt, by aiding European plant and animal breeders to establish "mendelized" varieties and breeds, to the general betterment of European standards of living

Science News Letter, June 8, 1946

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GEOPHYSICS

Earthquakes Can Be Set Off by Rain

➤ RAIN CAN HELP set off earthquakes, Prof V Conrad of Harvard University's Blue Hill Observatory told the American Geophysical Union It does not hasten the occurrence of all earthquakes, but only those resulting from the downbending of rock strata by the slow loading of erosional debris on top of them. The thousands of tons of water that filter down into the ground after heavy rains may prove the last straw in such a loading, increasing the strain in the supporting rocks to the breaking point

Contrariwise, where an earthquake is in the making as the result of forces from beneath pushing up on the rock layers, the added burden of accumulated rain water will push in the opposite direction, perhaps delaying the occurrence of the earthquake.

Science News Letter, June 8, 1946

ASTRONOMY

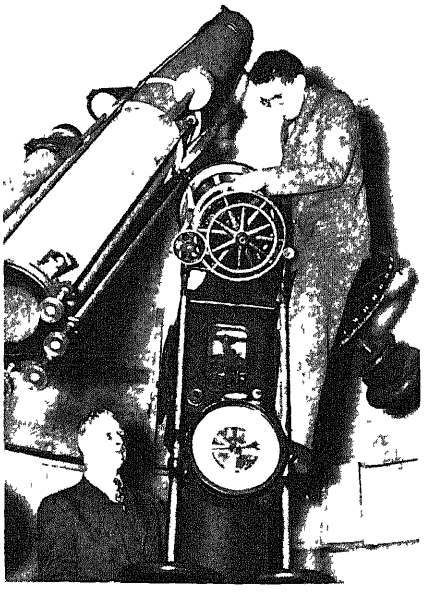
Harvard Observatory Given Large Telescope

➤ THE TELESCOPE that for the last three decades has delighted university students and visitors in Rochester, N Y, is being moved to Colorado to help probe the mysteries of the sun The large Bausch & Lomb Optical Co telescope has been made an outright gift to Harvard University

The telescope is expected to be installed by fall in the High Altitude Observatory at Climax, Colo, the world's highest observatory The Colorado observatory, astride the Rocky Mountain Divide, is operated jointly by Harvard and Colorado Universities

The telescope, fitted with special filters will be used primarily to study the sun's disk, including sun spots An attached motion picture camera will record the rapid changes occurring in the solar atmosphere The telescope boasts a 10½ inch lens and star dials that make it easy to read right ascension and declination and eliminate the necessity of computing hour angles

Science News Letter, June 8, 1946



GIFT TO HARVARD—Dr. Donald H. Menzel, Harvard Observatory, and Dr. John W. Evans, right, formerly of the University of Rochester Institute of Optics, inspect the Bausch & Lomb Optical Company telescope, which is to be dismantled and installed at the High Altitude Observatory, the highest in the world, at Climax, Colorado.

• Books of the Week •

THE ABSOLUTE WEAPON Atomic Power and World Order—Frederick S Dunn, Bernard Brodie, Arnold Wolfers, Percy E Corbett, and William T R Fox—*Harcourt,* 214 p, $2 Essays based realistically upon the world as it is today, analyzing the nature of the atomic bomb and its effect on international relations, and pointing to the road the world must follow to find freedom from fear of the atomic bomb

AMERICAN AVIATION DIRECTORY Spring and Summer, 1946, Wayne W Parrish, ed—*American Aviation Publications,* 621 p, paper, $5 Aviation officials and companies of U S, Canada, Latin America, Africa, Europe, and Australasia

BUILDING AN ENGINEERING CAREER—Clement C Williams—*McGraw,* 309 p, tables and illus, $2, 2nd ed A book for use among college freshmen or secondary school students the purpose of which is to make clear the character of the engineering profession and its relation to society and to inculcate from the outset careful intellectual habits This new edition takes into account recent developments in the science

BULLETS BY THE BILLION—Wesley W Stout—*Chrysler Corp,* 75 p, illus, free The story of the Chrysler Corporation's assembly plant in Evansville, Ind, where during the war ammunition was made in astronomical amounts

CATALOG OF AMERICAN STANDARDS—*American Standards Assn,* 23 p, paper, free A list of 845 standards including definitions of technical terms, specifications for metals and other materials, dimensions, safety provisions for the use of machinery, methods of work and methods of test for the finished product

THE COMMON SENSE BOOK OF BABY AND CHILD CARE—Benjamin Spock, M D—*Duell,* 527 p, illus, $3 A book which combines basic physical and medical information with psychological interpretation, which makes available the evidence of the specialist and translates theory into the actuality of handling your child

ESSENTIALS OF PLANE AND SPHERICAL TRIGONOMETRY—Clifford Bell and Tracy Y Thomas—*Holt,* 163 p, tables and diagrs, $2 30 with tables, $2 00 without tables, rev ed An enlarged edition of a textbook the purpose of which was to provide a brief but mathematically accurate text suitable for short courses during the wartime emergency This edition contains sections on vectors, plane navigation, applications to surveying, complex numbers, etc

FLAGS OF ALL NATIONS— Cleveland H Smith and Gertrude R Taylor—*Crowell,* 152 p, illus, $2 50 Full color illustrations and an explanation of the symbolism and of the historical development of our flag, the flags of U S territories and dependencies, and of all sovereign nations

GENERAL BACTERIOLOGY LABORATORY MANUAL—L S McClung—*Saunders,* 106 p, diagrs, $1 25. A work book of laboratory exercises for classes in introductory bacteriology The basic experiments serve not only to introduce the student to subject material, but to aid him in acquiring proficiency in essential techniques

JOB PLACEMENT OF THE PHYSICALLY HANDICAPPED—Clark D Bridges—*McGraw,* 329 p, tables and illus., $3 50 The essential factors involved in selecting and placing workers from the standpoint of physical ability New techniques for determining demands of jobs, the abilities of workers, and the matching of workers to jobs are recommended

PEOPLES SPEAKING TO PEOPLES A Report on International Mass Communication from The Commission on Freedom of the Press—Llewellyn White and Robert D Leigh—*Univ of Chicago Press,* 122 p, $2 A discussion of our information agencies, of proposals for and against a merger of leading American telecommunications corporations, of censorship and of practical means to reduce it, and of the mission of radio, books, and motion pictures

QUESTIONS AND ANSWERS ON GOVERNMENT INSPECTION OF PROCESSED FRUITS AND VEGETABLES—*Government Printing Office,* 20 p, illus, paper, 10 cents The reasons for and nature of government inspection, what U S Standards are, how inspection is accomplished U S Department of Agriculture, Miscellaneous Publication, No 598

RUSSIA ON THE WAY—Harrison Salisbury—*Macmillan,* 425 p, $3 50 A picture of life in contemporary Russia, written by a foreign correspondent who was Chief of the United Press Bureau in Russia for eight months

TYPES AND PROBLEMS OF PHILOSOPHY An Introduction—Hunter Mead—*Holt,* 402 p $3 A presentation of the principal problems of philosophy in terms of the most significant movements and schools active today A textbook for use in beginning philosophy courses

YOU CAN STAY WELL—Adelle Davis—*Graphic Arts Research Foundation,* 89 p, tables, paper, $1 An abridged edition of the book by the same name which has been out of print A story presenting usable facts about diet Since a good diet requires more than the proverbial grain of salt, it might be well to warn the reader that nutrition is not the only factor necessary for good health.

Science News Letter June 8, 1946

MEDICINE

Nerve Cutting Operation Relieves Stomach Ulcers

➤ A NEW NERVE cutting operation that brings relief to long-standing sufferers from stomach ulcers was reported by Dr. Lester R. Dragstedt of the University of Chicago to the American College of Physicians.

The operation consists in dividing the vagus nerve at a point on the left side of the chest just above the diaphragm or, in some cases, in the abdomen below the diaphragm

The operation has been done on 73 patients with various types of stomach ulcers who had not been helped by other forms of treatment and were having frequent hemorrhages, pain or other symptoms

Except for one man with a gastrojejunal ulcer and one woman with a duodenal ulcer, the operation has given "immediate, complete and permanent" relief of symptoms The patients have gained weight and in most cases there is objective evidence of healing of the ulcers

In the three and one-half years since the first patient was operated on, none of the patients has had a recurrence of ulcers, hemorrhage or perforation The patients are allowed to move around the first day after the operation and they do not take any medicines nor do they have to follow any special diet

The abnormally large, continuous secretion of stomach juice during the night and an increased activity of the fasting stomach in patients with duodenal ulcer returns to normal after the vagus nerve to the stomach has been cut This bears out the opinion of many medical scientists that stomach ulcers originate in emotional conflict and nervous tension

Science News Letter, June 8, 1946

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New Machines And Gadgets

⚙ *SOAP DISPENSER squirts the liquid material into a user's hands without being touched. When the hands are cupped to receive the soap, they are in a position where they break a beam of light directed against a photoelectric relay. This causes a flow of electric current to operate the dispenser.*

Science News Letter, June 8, 1946

⚙ *ERASING MACHINE for use in drafting rooms is small, portable and power-driven. The eraser itself is a tube of rubber or other stretchable erasing material that fits over an extended shaft of the motor, the shaft having a flared end. This stretches out the ring of rubber that does the erasing.*

Science News Letter, June 8, 1946

⚙ *ELECTRIC hygrometer, for high-precision humidity measurement and control, employs a sensing element that is claimed to be the speediest device known for measuring humidity changes. It neither adds nor takes away moisture from the space whose moisture content is being measured.*

Science News Letter, June 8, 1946

⚙ *OIL-BURNING furnace with a new vacuum draft needs no chimney of the ordinary type as a draft-creating device. It uses a suction fan which pulls air through the combustion chamber and discharges combustion gases through a vent exhaust.*

Science News Letter, June 8, 1946

⚙ *PLASTIC GLOBE, weighing only 70 pounds although 52 inches in diameter, aids air pilots and stewardesses to study world routes, as shown in the picture. It is made of five layers of fabric, each impregnated with a solution of cellulose acetate and a protective coat of the same plastic covers the map.*



Science News Letter, June 8, 1946

⚙ *RUBBER RINGS, with central slots running around their outer faces, fit snugly into the curved ends of wire coat hangers and keep garments from slipping. The walls of the ring enclose a chamber within which an insecticide may be placed.*

Science News Letter, June 8, 1946

⚙ *RADIO-TELEFAX, a new type of telegraph communication, sends by radio a picture, or facsimile reproduction, of a message written on a telegraph blank and wrapped around the cylinder of the transmitter. Pilot boats outside New York Harbor are using the system to report incoming ships.*

Science News Letter, June 8, 1946

⚙ *FILM RECORDER of sound, an improved instrument, can be used as a public address system, and a speech can be broadcast at the same time. One hundred sound tracks can be indented across the width of the film, a dial shows the number of the track on which a recording or play-back is located.*

Science News Letter, June 8, 1946

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Question Box

ACOUSTICS

What new instrument imitates any musical sound? p. 361

ASTRONOMY

What company is giving a giant telescope to the Harvard Observatory? p. 366.

BOTANY-CHEMISTRY

Why should 2,4-D not be used on flowers in the yard? p. 363.

GENETICS

Who was the man who first discovered the principles of heredity? p. 366

GEOPHYSICS

What is the location of the hidden archipelago recently discovered? p. 358

MEDICINE

What is the method of obtaining a permanent record of the human heart action? p. 361

What is the new theory about smoking for diabetics? p. 359

PSYCHIATRY

How do doctors feel about the old theory that mental diseases are all hereditary? p. 365

What is now considered the best place to treat children suffering from schizophrenia? p. 356

What is the drug which is being used to improve the behavior of problem children? p. 355

RADIO

What is the radio navigation system which may be used to guide pilotless aircraft? p. 357.

SOCIOLOGY

What area constituted the known world to the Greeks? p. 356.

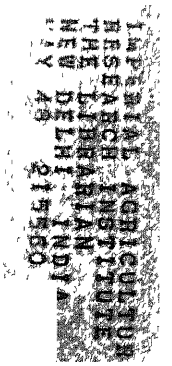
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IENCE NEWS LETTER

Vol. 49, No. 24

E WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 15, 1946

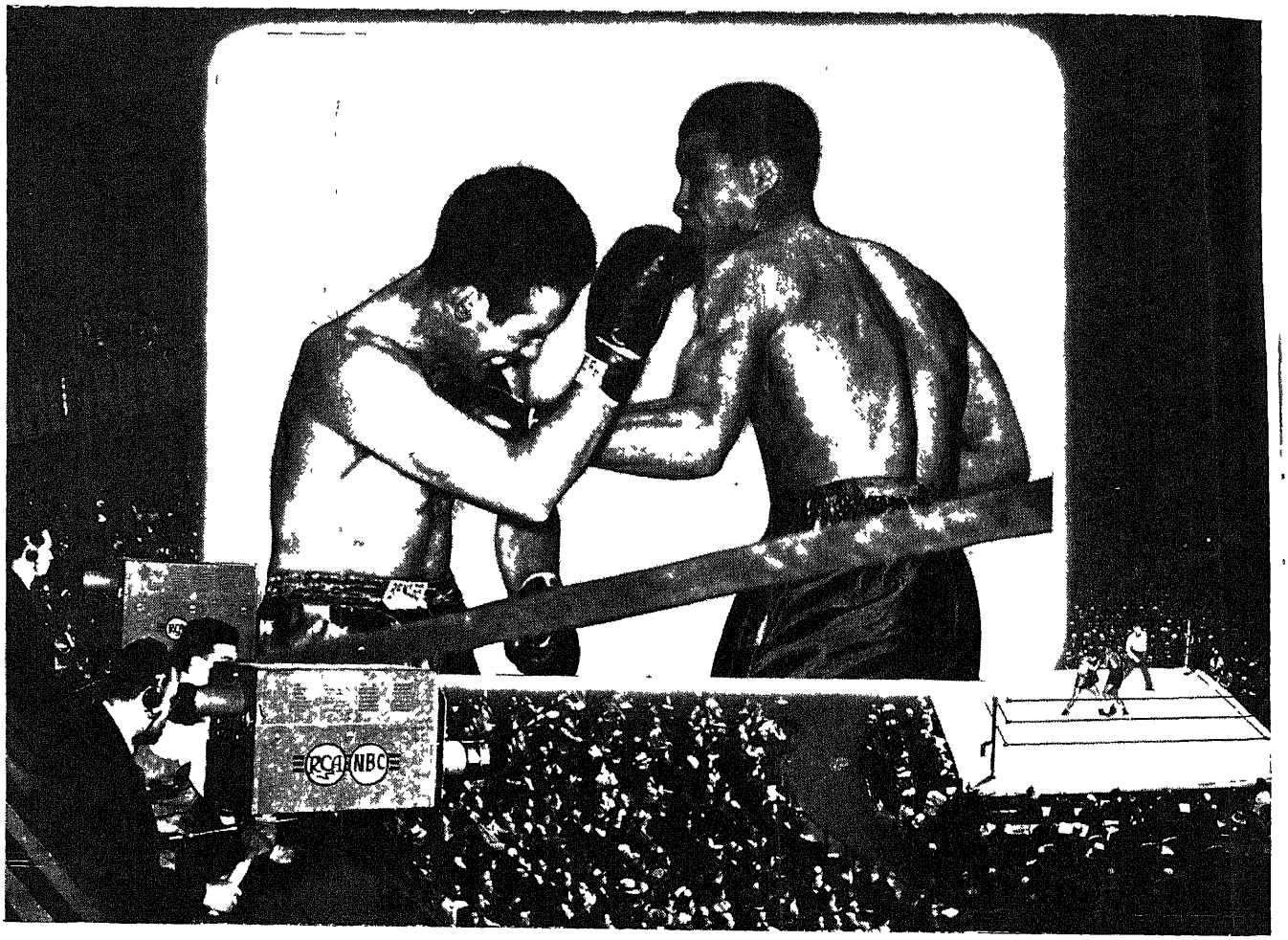


Ram Jet

See Page 371

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946



The big fight at the Yankee Stadium in New York in June will be televised by NBC

In the ring with Louis and Conn—through Television

When challenger meets the champ, thousands of people who can't be at the ringside in person will watch the battle through television. For on that night The National Broadcasting Company will take them right into the ring for a *referee's-eye view* of every punch!

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AERONAUTICS

Ram Jet, Navy's Newest

This light-weight open pipe engine has just been revealed to the public. It may be used to power planes and weapons at 1500 miles per hour.

See Front Cover

➤ HURLING AIRPLANES or guided missiles through space at twice the speed of sound, a "flying stovepipe" that burns oxygen from the air as it flies may propel the high-speed aircraft of the future or power the weapons of another war.

Ram jet, as the light weight, open-pipe engine is called, was revealed to the public for the first time by Vice Adm George F Hussey, Jr, chief of the Navy's Bureau of Ordnance, and Dr Richard Roberts, supervisor of the ram jet project at the Applied Physics Laboratory of Johns Hopkins University, Silver Spring, Md, who appeared as guests of Watson Davis, Director of Science Service, on Adventures in Science heard over the Columbia network

With no moving parts and no precision machinery ram jet is essentially a pipe with a small opening at the front and open at the rear, Dr Roberts said

"Air is scooped in and compressed by its own speed, fuel is injected and burned, the exhaust streams out the rear providing a thrust like a rocket motor," he explained

The impulse produced by the escaping hot gases shoots the 70-pound jet through the air at speeds between 800 and 1,500 miles per hour, but high speeds must be reached before ram jet can operate Ram jets have to be launched and brought to high speeds by catapults or separate booster rockets to operate the "flying stovepipe"

Though ram jet was developed in the late stages of World War II to power guided missiles against such weapons as the German V-bombs and Japanese suicide planes, Admiral Hussey declared, "It is also possible that ram jets will be attached to the wings of planes to allow them to cruise at supersonic speeds"

Dr. Roberts said that conventional engines and propellers are still best for low speed flying, while a turbo-jet engine is more efficient as the speed increases When the speed goes above that of sound waves, about 750 miles per hour, ram jet, with a "convenient cruising speed" of 1,500 miles per hour, is superior

While the theory of ram jet propulsion was first expounded in 1913 by a Frenchman named Lorin, the preliminary work that led to successful experiments was started in the summer of 1944 by the Applied Physics Laboratory of Johns Hopkins University where the famous proximity fuze was developed during the war

First actual tests of ram jet were made June 13, 1945, at Island Beach, New Jersey, and fishermen nearby joined the scientists as witnesses to the first flight of the new engine More successful than counted on, the first tests sent jets out over the Atlantic Ocean, and one landed 50 feet from a fishing boat off the New Jersey coast

As propulsion units for guided missiles, the ram jet has the advantages of being light and cheap The first tests were made using the exhaust pipe of a Thunderbolt plane with the modified part developing more power as ram jet than could the plane

Science News Letter, June 15, 1946

PHYSICS

Synthetic Oil Lubricates In Hot or Cold Weather

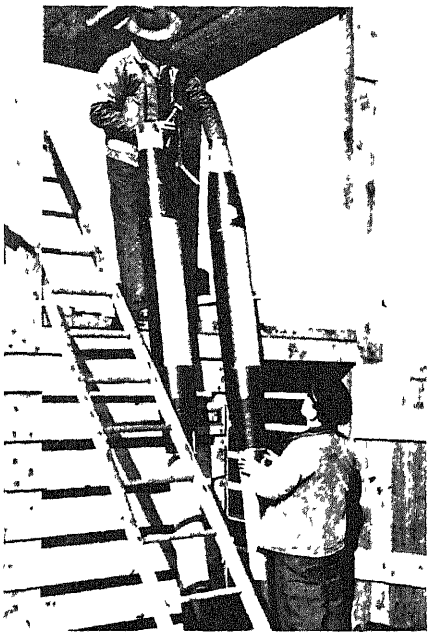
➤ SYNTHETIC SILICONE OILS, made by juggling molecules of sand, coal, oil and brine, lubricate effectively aircraft instruments at sub-zero temperatures, Westinghouse tests demonstrate They also protect ball and needle bearings against corrosion in tropical climates

These new oils perform well in changes from hot to cold weather conditions, as they will not evaporate in extreme heat and will flow freely in extreme cold

In the tests temperatures were lowered to 85 degrees below zero Fahrenheit, and raised to the temperature of vapor from boiling water

The silicones are American-developed synthetic resins made of sand and organic compounds. Both silicone oils and silicone greases are made, as well as many other products with many uses.

Science News Letter, June 15, 1946



FLYING STOVEPIPE—Successful working models of the Navy's revolutionary ram jet, a means of propulsion for flight at supersonic speeds up to 1500 miles per hour.

ASTRONOMY

New Molecular Bands On Jupiter and Venus

➤ HITHERTO UNKNOWN molecular bands of carbon dioxide around Venus, planet nearest to the earth, and of ammonia around Jupiter, largest of the planets, have been photographed at McDonald Observatory, Fort Davis, by use of a new infrared spectrograph

Light of wave lengths of the order of one micron are photographed with the spectrograph, explained Dr Otto Struve, director of the observatory owned by the University of Texas and operated jointly with the University of Chicago. This invisible form of infrared radiation is focused by means of a mirror and a grating plated with a thin coating of gold

Actual observations of the molecular bands were made at McDonald Observatory by two University of Chicago staff members, Prof G Herzberg, authority on the structure of molecules, and Dr W. A. Hiltner, assistant director of the Yerkes and McDonald Observatories

Studies with the infrared spectograph may disclose other information about the little-known atmosphere of neighboring planets. Researches at McDonald Observatory will be extended to still longer wave lengths of invisible light.

Science News Letter, June 15, 1946

ASTRONOMY

Bright New Comet

The comet which was spotted in the northeast sky by a Washington, D. C., business man has been named Pajdusakova-Rotbart.

➤A BRIGHT new comet was discovered in Washington, D C, early Thursday morning, May 30, by an amateur astronomer, David Rotbart, a Washington business man Looking through binoculars at 2 a m, EST, Mr. Rotbart spotted the sixth magnitude comet in the constellation of Cygnus, the swan. Just bright enough to be seen with the naked eye, the tail was less than one degree and the comet had a nucleus.

Discovery of the comet was confirmed at the U S Naval Observatory early Friday morning, May 31 The comet was found to be moving quite rapidly toward the northwest

Word of discovery of this comet by an observer in Europe had just been received at Harvard College Observatory, clearing house for astronomical information in America. A cablegram from Dr Elis Stromberg at Copenhagen reported that it was located at 7:30 p m, EST, Wednesday, May 29, by a European astronomer named Pajdusakova The comet at that time was estimated to be about the eighth magnitude, too faint to be seen with the naked eye

This new heavenly object will be called the Pajdusakova-Rotbart comet, the two men having discovered it independently This is the first comet that Mr. Rotbart has reported He has a wide-angle telescope and three pairs of binoculars he uses in his observations.

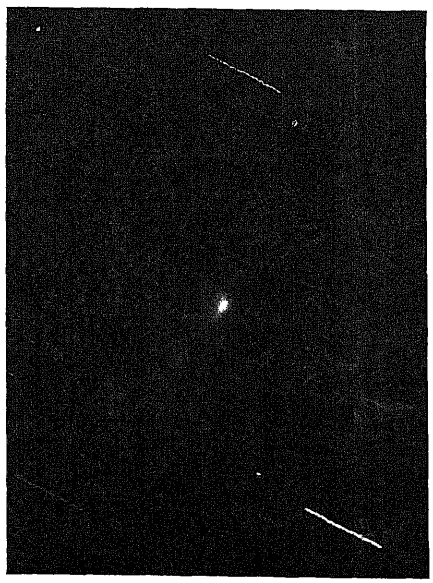
When found, the comet had a right ascension of 20 hours, 36.8 minutes, and a declination of 30 degrees, 4 minutes. Rough observations made twenty minutes apart at the Naval Observatory by Alfred Mikesell showed the comet moving westward about one hour per day and northward eight degrees daily

Located in the constellation of Cygnus, the swan, the comet sped across the constellations of Lyra, Hercules and Bootes, the herdsman, toward the constellation of Coma Berenices, Berenice's hair. The rapid motion of the comet through the heavens may be accounted for by the fact that it is moving around the sun in the opposite direction from the earth, states Leland E Cunningham of the University of California, who computed its orbit

It was closest to the sun on May 11, when it made what astronomers call its perihelion passage It was then about 95 trillion miles from the sun, just a little more than the average distance of the earth from the sun.

Bright enough to be picked up with binoculars when first spotted, the comet faded rapidly The moon interfered with the comet during the week-end of June 9, and it will probably be too faint to be seen with small telescopes after full moon, June 14.

Science News Letter, June 15, 1946



NEWEST COMET—Comet Pajdusakova-Rotbart as it appeared in the northeastern sky on June 4, photographed at the U. S. Naval Observatory, Washington, D. C., with their 10-inch photographic equatorial telescope. The star trails are "wiggly" because of guiding done on the comet during exposure.

Wood on land is attacked by decay-producing fungi and such insects as termites, and wood under water by the marine wood-boring teredo and other forms of life that seek shelter or food

ORNITHOLOGY

Sparrows and Starlings Build Duplex Nest

➤ HERE'S A story of housing shortage in the bird world Birds do share duplex apartments A pair of English sparrows and a pair of starlings built their nests together like a double house, each having its own side, Lewis E Potts reports to the American Museum of Natural History

The birds fought continuously while building their nests. After a month of squabbles, peaceful neighborliness reigned

Science News Letter, June 15, 1946

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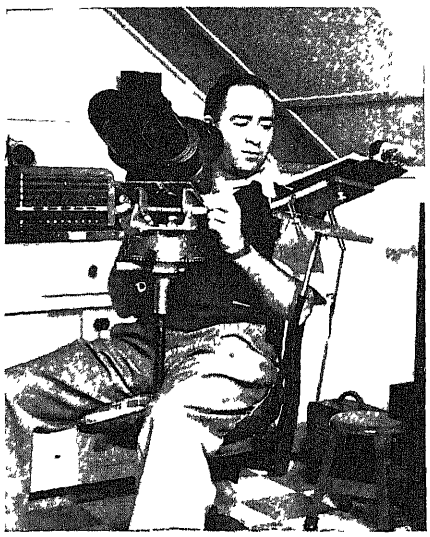
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COMET - DISCOVERER — David Rotbart is shown in his home observatory. The binoculars he is holding are the ones with which he spotted the new comet, which will bear his name along with that of its co-discoverer, Pajdusakova, a European astronomer, who cited it on May 29.

GENERAL SCIENCE

Seven Blind Spots Still Unsolved by Scientists

➤ SEVEN SECRETS or mysteries, major unknowns that need scientific attention and exploration to conquer, were pointed out at the Southwest Chemurgic Conference by Watson Davis, director of Science Service, Washington, D C

The conquest of some of these blind spots may not come for years or decades, he said The acceleration of science's achievements may bring some in a relatively short time

First is the secret of photosynthesis This is the greatest unknown It is what the green leaves do when they capture the energy of the sun and store it in the form of food

Second is the secret of life, and third, the secret of the universe, and then the secret of the chemical elements The other three Mr Davis called mysteries They are the mystery of disease, the mystery of mind and emotions, and the mystery of war "War is a major problem worthy immediately of our best research," he added

Science News Letter, June 15, 1946

AERONAUTICS

Rainmaker Aids Landings

➤ A RAIN-MAKING machine now under construction may solve the problem of clearing fog-bound landing fields and prevent many of the fatal air crashes now caused by "ceiling zero" visibility at airports

The rainmaker sends out sound waves that drive the fog particles together, forming rain drops The rain falls, clearing the air field This attack on the fog problem proved effective in tests during the war at the Navy's Landing Aids Experiment Station at Arcata, Calif, where sirens were used to blast the fog, but the new machine may do a more subtle job

Sirens not only turned the fog to rain but also made personnel on the field sick and knocked birds out of the sky, so the new machine will be able to generate sounds of such high frequency that they cannot be heard by human or animal ears

The rainmaker, being built by Ultrasonic Corporation, is a high-powered sound generator equipped with a wide frequency range for experiments to determine how much sound of what frequency will do the best job clearing different types of fog

The Navy's Office of Research and Invention expects to spend $100,000 for the construction and experiments with the rain machine that is scheduled to be tested at Arcata, where the Army, Navy and civilian air groups now test all-weather landing aids The Navy hopes to try out the instrument in September at Arcata before the fog season there ends.

An air jet-type, acoustic generator, the rainmaker will be about eight feet in diameter with a parabolic reflector An earlier model gave good results in the laboratory, but lacked the controlled frequency range of the new machine.

Tests to be made at Arcata with the acoustic generator include experiments with the effects of sound waves on the structure of airplanes and on personnel in planes

Most successful wartime fog dispersal systems, the famous FIDO (fog, intensive dispersal of), used controlled fires along the runways to clear the fog over landing strips. The greatest disadvantage of these units, the high fuel cost per landing, is being overcome by a new thermal installation nearing the test stage at Arcata, but the Navy is looking to the possibility of sound replacing heat in the fight against fog

Even if the sonic system does not prove practical for airports, officials of the Office of Research and Invention declare that new and important information about sounds and their uses will be gained from the rainmaker

Science News Letter, June 15, 1946

SURGERY

Removing Brain Tumor Restores Sight

➤ AN UNUSUAL case of recovery from blindness that had lasted six months is reported by Dr J Grafton Love and Dr C Wilbur Rucker of the Mayo Clinic. The recovery was due to removal of a brain tumor that "interrupted" the left nerve of sight and practically all the nasal fibers of the right one.

On the morning of the operation the patient was totally blind in the left eye and could not see enough with his right eye to count fingers held 12 inches from his eye Two weeks later examination showed "excellent improvement and return of vision in the nasal portion of the field of the left eye" Improvement of eyesight also occurred in the less seriously affected right eye.

Within three months after the operation the patient was back at his work as repair foreman in a railway yard, a job he had had to quit six months before the operation because of the blindness, which had been coming on for a year.

Science News Letter, June 15, 1946

NUTRITION

Baby Food to Be Kept In Freezer, Not a Can

➤ BABIES WILL eat frozen foods in the near future Dr Leonora Hohl, food technologist on the Berkeley campus of the University of California, says that frozen foods are better for babies than some types of canned foods

The frozen foods retain a large percentage of the vitamins over long periods. They have more eye-appeal and are more palatable in many cases. Only what is wanted for a serving need be thawed at one time.

Hospitals and other large institutions will be the first large users of frozen baby foods, Dr. Hohl predicts.

Science News Letter, June 15, 1946

ELECTRONICS

Magnetic Detector

Used during the war to locate Nazi U-boats, these detectors will now be used in locating oil, and for other geological surveys.

➤ AIRBORNE MAGNETIC detectors, that helped locate German submarines under water, will be found usable, it is expected, in locating oil in depths below the surfaces of the continental shelves surrounding America which were recently claimed by the President and put under federal jurisdiction

These magnetic detectors were installed on the wing of an airplane or on the forward part of the belly of a blimp They reacted to the magnetic metal in a submarine below The magnetic reaction activated a needle on the instrument board, notifying the crew of the presence of an underwater boat Then by circling and following the needle's directions, the pilot was able to determine the exact position of the enemy boat

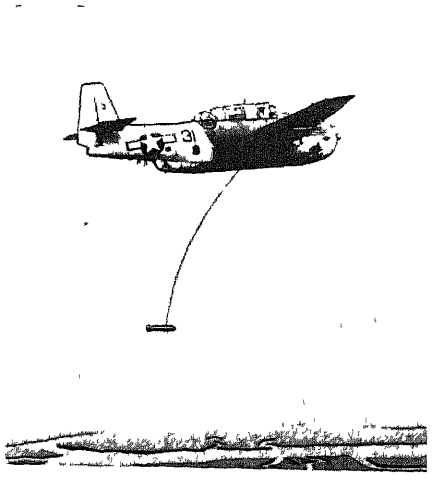
In geological work, these airborne magnetic detectors would be employed in much the same way as ground-based precision instruments are now used in making so-called magnetic geological surveys In a recent magnetic survey of Florida by the U S Bureau of Mines results were obtained that indicated areas favorable for the occurrence of petroleum

Essentially, a magnetic survey is a method of determining the contours of underlying granites and other formations —known to geophysicists as the "crystalline basement" A knowledge of the crystalline basement, particularly in areas covered by marine sediments, is of fundamental importance in oil exploratory work, according to Dr R R Sayers, Director of the Bureau

The invention and development of the wartime magnetic airborne detector has been officially a secret until information was released by Dr George B Pegram of Columbia University Some of the development work was done by the university's Division of War Research, under a project of the U S Office of Scientific Research and Development

Magnetic detectors were developed also by the Naval Ordnance Laboratory, and the Bell Telephone Laboratories, and by the Gulf Oil Corporation working independently and later under contract with the National Defense Research Committee Gulf research laboratories began work on a "flying eye" in 1940, and made a successful flight test in 1941

Science News Letter, June 15, 1946



MAGIC EYE—Here we see the magnetic detector being flown from the wing of a plane as it will be used to locate oil below the surface of the continental shelves.

RADIO

"Hams" Reach New High In Radio Frequency

➤ RADIO communication in the ultra-high frequency field at 21,900 megacycles, a new record high for amateurs, has been completed by two "ham" operators

Dr A Harry Sharbaugh, Jr, and Robert L Watters, both scientists in the General Electric Research Laboratory, communicated across 800 feet, using the ultra-high frequency waves approaching the length of the longer light waves Radio waves at such high frequency behave more like light waves than conventional radio waves, the operators reported.

First amateur invasion into the super-high frequencies of wartime radar was reported a few months ago at 5,300 megacycles when the Federal Communications Commission first assigned these bands to amateur radio operators

Science News Letter, June 15, 1946

FOOD TECHNOLOGY

Thin-Sliced Potatoes Dried While Frozen

➤ CALIFORNIA may have sun-dried raisins and prunes, Alaska offers something new—and not under the sun, either, for it is done best in the long, frigid dark of the subarctic winter nights It is a process for cold-drying potatoes, worked out by Dr Basil M Bensin, agronomist at the Alaska Agricultural Experiment Station

Dr Bensin's process consists in slicing raw potatoes very thin—from one-sixteenth to one-eighth inch—spreading the slices on a wire-netting frame, and setting them outdoors in the cold air for from 50 to 60 hours They freeze immediately, but lose water even while they are frozen It is not evaporation, strictly speaking; such loss of water from the frozen state is technically known as sublimation In Dr Bensin's experiments potato slices lost more than 60% of their water content Their vitamin content remained unchanged, he states.

The potato slices darken on exposure to the air, as all potatoes do This is a result of a simple enzyme reaction, and does not affect their food value The original white color can be restored by bleaching with sulfur dioxide, a standard method long in use for bleaching dried fruits and vegetables.

Dr Bensin believes his process can be applied also to other Alaska-grown vegetables, like carrots, beets and parsnips The frost-dried products, compact and light-weight, should be useful additions to the food supplies of prospectors, miners, trappers and other men who have to watch the weight of their field rations

A frozen-dehydration process has been used in the preparation of dried blood plasma and serums and in the crystallization of penicillin A similar process has also been patented for the preparation of dehydrated foods without heating them, and is expected to be in commercial production within a few months But these processes require elaborate and expensive refrigeration machinery, and often vacuum pumps as well All Dr Bensin needs is a sharp knife, some wire netting and wood—and the Alaska winter

Science News Letter, June 15, 1946

Among the *deaths* during 1944 in the United States, there were 1,225 of persons reported to be 100 years old or over.

AVIATION

Flying Records Announced

The Army Air Forces have established new world records with standard production-line airplanes, including the new jet fighter and the helicopter.

➤ NEW WORLD aviation records have been established by the Army Air Forces They were made by standard, currently operational, production-line aircraft stripped only of armament Some of the records were established at Wright Field, Ohio, others in load-altitude tests, with B-29 aircraft at Guam

On April 19, a Lockheed Shooting Star, the P-80, made a record of 495 miles per hour over a 62-mile low-level run from Wright Field to Jeffersonville, Ohio, and return, losing much time in slowing down to make the turn at its half-way point This beat the existing record by over 100 miles an hour

A month later a P-80 flew a 1,000 kilometer (approximately 621 miles) course and a 2,000 kilometer course at an average speed of 440 miles an hour The previous record was 325 miles an hour The 2,000-kilometer trip was made at 35,000-foot altitude, and over half the way had inclement weather which made it necessary to fly on instruments "talked around" by radar operators who followed the plane on their radar screens

This 440-mile record over the 621-mile turn-around course was shattered on June 3 by a Shooting Star which flew the same route at an average speed of 462 miles an hour

Six records were broken on May 17 by the famous Boeing B-29 They are

Speed over a 1,000 kilometer course with 1,000 kilogram (2,205 pounds) payload, 369 miles per hour, previous record 326 mph.

Speed over a 2,000 kilometer course with 1,000 kilogram payload, 366 mph, previous record, 311 mph

Over 2,000 kilometer course with 2,000 kilogram payload, the same as the above with the same previous record

Over a 2,000 kilometer course with 5,000 kilogram payload, 366 mph, bettering the earlier record of 251 mph

Over a 1,000 kilometer course with a 5,000 kilogram payload, 369 mph. 110 miles more than the standing record

Over a 1,000 kilometer route with 2,000 kilograms of load, 369 mph, as compared with a previous 321 miles per hour.

On the same day another B-29 covered a 1,000 kilometer course with a payload of 10,000 kilograms averaging 358 miles per hour, and a 2,000 kilometer course with the same load at an average speed of 356 miles an hour Previous records were 207 and 205 miles per hour respectively

A helicopter duration performance was broken on May 13 when a Sikorsky R-5 remained in the air nine hours, 33 minutes and 27 seconds The earlier record was one hour and 32 minutes

On May 22, an R-5 helicopter made a non-stop flight from Wright Field to Boston in 10 hours and three minutes It is a record for helicopter distance On June 3, a Sikorsky-5A made a new international speed record of 110 5 miles an hour, the previous world record being slightly over 76 miles

Science News Letter, June 15, 1946

Oregon ash belongs to the olive family, besides the edible olive, this family includes the lilacs, forsythias, and the privets

HERPETOLOGY

Snake Buried in Sand Is New Desert Danger

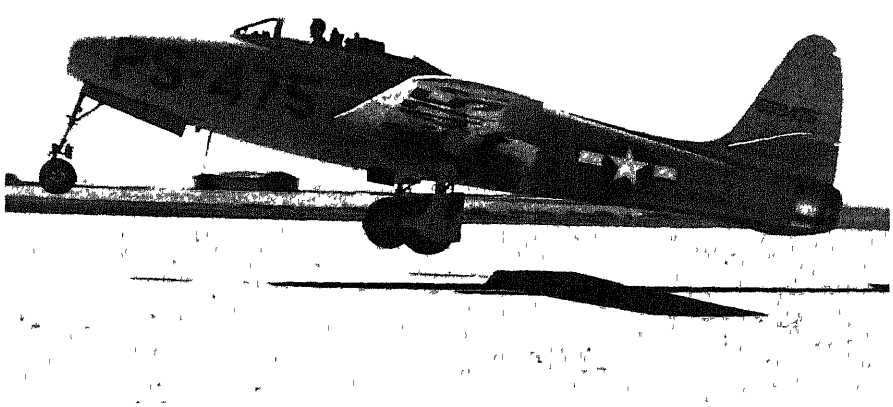
➤ RATTLESNAKES buried in the sand offer a new hazard in the desert A sidewinder, which is a rattlesnake that does not coil like others of its breed, but before striking makes a figure S with its head, was caught in the act of submerging itself beneath the California desert sand by Dr Raymond B Cowles of the University of California at Los Angeles

"When bedding down, the sidewinder forms a tight coil or pad," Dr. Cowles states, "and then proceeds to edge or nudge the sand outward from beneath its body It thus forms a saucer-shaped depression in which it lies with the back of its body flush with the surrounding surface"

While some snakes may wiggle down into the sand, others may become covered by wind-blown sand Sidewinders, mostly active at night, usually bury themselves in sand during the daytime or come to rest on the shady side of a tree or bush

North African vipers, Old World counterparts of the California desert sidewinder, are known to bury themselves in the sand But in 15 to 20 years of collecting snakes and lizards, Dr Cowles remained skeptical about the sidewinder until he actually saw one so buried.

Science News Letter, June 15, 1946



RECORD BREAKER—The Republic Thunderjet, new XP-84 jet fighter, has just been revealed by the army. Its speed is more than 590 miles per hour, and it has a service range of 1,000 miles and ceiling above 40,000 feet.

MEDICINE

Too Little Protein Does Not Cause Dropsy

➤ FAMINE SUFFERERS get dropsy but, contrary to general scientific belief, it is not because they have had too little meat and other protein foods

Evidence for this new view, which upsets the almost universally held theory developed after World War I, was obtained from 34 men, volunteers from civilian public service, who lived on a European type of famine diet for six months The new findings are reported by Drs Ancel Keys, Henry Longstreet Taylor, Olaf Mickelsen and Austin Henschel, of the University of Minnesota, in the journal, *Science* (May 31)

In spite of the low amount of protein furnished by their diet of whole cereals, potatoes, turnips and so on, the concentration of protein in the blood plasma of the volunteers fell only slightly and the ratio between two kinds of protein, albumin and globulin, in their plasma remained within normal limits.

The men lost a quarter of their body weight and they did develop dropsy Their clinical state closely resembled that seen in Europe in 1945 They showed no signs of kidney or heart failure Reports from studies of European famine sufferers, Dr. Keys and associates say, bear out their finding that famine edema or dropsy is not simply a result of too little protein in the blood or of kidney or heart failure.

Science News Letter, June 15, 1946

PSYCHIATRY

Man-Created Moon and The Atomic Bomb

➤ THE ASTRONOMICAL possibility of creating and putting into operation a second moon of the earth was suggested to the American Psychiatric Association by Dr Harlow Shapley, director of Harvard College Observatory.

Given enough money and time, Dr Shapley said, man could fashion a tiny object, radio equipped and jet controlled, which could be sent the proper number of thousand miles aloft and then caused to travel gravitationally at the same speed as the earth's surface beneath so that it would seem to stand still at one spot over the earth's equator

This stunt would have no real useful purpose, but it would be no more crazy to do this than many other things that are being done, Dr Shapley told the psychiatrists

Among the "miscellaneous lunacies of the higher terrestrial animals" cited by Dr Shapley were the making of atomic bombs as instruments of foreign policy and the holding of expensive atomic bomb demonstrations while millions of Europeans and Asiatics starve

Any connection between human lunacy and the moon is wholly superstition, Dr Shapley reassured the experts on mental troubles, except for "possible subjective effects upon susceptible patients who, hearing that full moonlight promotes silliness, become silly"

Science News Letter, June 15, 1946

NUTRITION

High Protein Diet Prevents Dog Hysteria

➤ TO PREVENT your dog from having running fits, or canine hysteria, be sure he has a sufficient supply of high quality protein

This is the advice of Dr Agnes Fay Morgan, noted University of California nutritionist, who has studied running fits in dogs for several years

Dr Morgan says that laboratory experiments show that running fits can be prevented by dietary means Some experts have contended that canine hysteria is a matter of heredity, while others have failed to prevent the ailment by the administration of high concentrations of vitamin B content

Dr Morgan and Mary Groody, researcher, fed dogs on a diet consisting of nothing but a commercial dog food containing wheat flour, wheat germ, bone meal and salt, meat meal, soy bean, and special vitamin supplements. This diet produced fits in nearly all dogs tested after periods ranging up to 19 days The dogs also lost weight and were nervous

The running fits ceased after a few days during which fresh ground beef lungs, meat scraps, and fish were fed to the animals

Dr Morgan and Mrs. Groody concluded that this indicated the protein content of the dog food was not high enough in quantity or quality.

The commercial producers added fresh ground beef lungs, meat scraps and ground fresh fish to their dog food, this formula was tested by Dr Morgan and Mrs. Groody, with the result that dogs did not contract running fits, even after more than two months feeding.

Science News Letter, June 15, 1946

IN SCIENCE

ASTROPHYSICS

Put More Windows on the South Side of the House

➤ MANY HOME owners would be interested to find out what the sun can do by way of competing with coal

A modern house with 100 square feet of south-facing window area can soak up in one winter season enough heat to save a ton of high-grade anthracite, Irving F Hand of the U. S Weather Bureau told his fellow-scientists at the meeting of the American Meteorological Society He made his calculations at the Blue Hill Observatory of Harvard University, where he is stationed Houses farther south can make the coal-pile last a little longer with solar assistance, he added

It is better to put windows on the south face of your house than on the east, Mr. Hand state south windows are much more efficient sun-traps, and east windows are difficult to shade in summer

Science News Letter, June 15, 1946

AERONAUTICS

New Army Jet Fighter Has Greater Speed and Range

➤ THE NEWEST ARMY jet fighting plane, designed and constructed by Republic Aviation Corporation, has been thoroughly tested and a hundred or more will be built during the coming year It is about the size of the Lockheed P-80, but somewhat heavier, and is claimed to have all the better characteristics of a great fighter plane

Information concerning the new plane was revealed at Wright Field, Ohio, to a group of aviators and scientists It has a speed of more than 590 miles an hour, a service range of 1,000 miles, and a service ceiling of over 40,000 feet.

The XP-84 Thunderjet, as the plane will be called, is powered with a General Electric jet engine Its air-scoop is located in the nose of the plane rather than on the sides, the customary place. It has an electrically operated removable canopy over the pilot which can be quickly opened at all air speeds to permit an emergency exit.

Science News Letter, June 15, 1946

E FIELDS

MEDICINE

Vitamin D May Help Fight Tuberculosis

➤ VITAMIN D, the anti-rickets vitamin, may lead to a new chemical attack on tuberculosis and other germ diseases, it appears from studies reported by Dr Walter Raab, of Glenn Dale, Md , Sanatorium, in the journal, *Science* (May 31)

Injection of a concentrate of vitamins A and D into the membrane surrounding the lungs in tuberculous empyema resulted in disappearance of the germs, he reports

Large doses of vitamin D injected into guinea pigs suppressed tuberculosis in these animals

The anti-germ action of vitamin D is not related to its anti-rickets action, Dr Raab found Ergosterol, parent chemical of the vitamin, which has no rickets-preventing power, also stopped the growth, in test tube experiments, of tuberculosis germs and another organism, staphylococcus aureus So did cholesterol, a related chemical These substances are related through phenanthrene, which includes in its chemical relatives sex hormones, bile salts, certain heart disease remedies and morphine

Science News Letter, June 15, 1946

RADIO

New York-Moscow Radio Messages Relayed

➤ THE WORLD'S worst magnetic storm area, which lies on the direct air route from New York to Moscow, is by-passed by radio messages using a new automatic radio relay station in North Africa opposite Gibraltar.

The new relay, now successfully tested, is in the International Zone at Tangier. A radio message between the two cities will travel 1,300 miles farther by way of Africa than over the direct route, but the difference in time required is negligible, and it will pass far south of the magnetic storm region The station will provide uninterrupted radio communication between the United States and the Soviet Union.

The direct airwave route from New York to Moscow passes west of Newfoundland, just south of Greenland, over the southern tip of Iceland, and across central Norway and Sweden It passes so close to the North Auroral Zone, or magnetic storm area, that shortwave radio signals fail to get through when sun-generated storms occur.

The African relay station was constructed by the Radio Corporation of America Henry E Hallborg of the company, an authority on geomagnetism, explains the need of this alternate route

"One of the worst trouble areas," he says, "is the North Auroral Zone, a ring 60 miles above the earth's surface around the North Magnetic Pole It is approximately 700 miles wide and is caused by radiation from the sun attracted to the pole During normal conditions of the ionosphere, radio signals pass through it, but when sun spots appear, the width of the ring may spread to as much as 2,800 miles in diameter. At such times, the ring becomes turbulent and overlaps the direct path between New York and Moscow"

Science News Letter, June 15, 1946

AVIATION

Airport Traffic Control System Demonstrated

➤ THE MOST effective military airport traffic control yet developed was demonstrated to the national press conference, at Clinton County Army Airfield, Wilmington, Ohio

Nine giant planes landed, one closely following the other, each directed by radio orders from a control station.

It is a radar-radio system, the CPN-18 (XW-1), designed to survey by radar an area 40 miles in radius, identifying each plane and feeding it into a landing approach system such as GCA (Ground Control Approach) or SCS-51 (Localizer Glide Path).

Basically the CPN-18 unit operates on the war-developed radar principle. The unit's transmitting station sends out a rotating search beam of radar pulses which scans the surrounding area. The beam picks up every plane in the area and makes them visible to operators on radar scopes The operators then direct the approaching planes for position and landing by radio With this system, the station has identified and channeled aircraft into the approach at the rate of 40 planes per hour, even under conditions of low ceiling and poor visibility.

Science News Letter, June 15, 1946

ARCHAEOLOGY

Ancient Cities Died When Rivers Changed Course

➤ ANCIENT CITIES along the Tigris and Euphrates rivers, or canals connected with them, became doomed when these rivers changed their courses, withdrawing the cities' lifeblood No harder blow could have been dealt to a city than to be deserted by the river upon which it depended for trade and agriculture

The ruins of many cities in this region today are inaccessible. Far too many of them, after flourishing for several centuries, were completely abandoned Changes in the rivers' course are largely responsible, Dorothy Mackay states in *Antiquity*, British quarterly review of archaeology

Man's original settlements, when he gave up nomadic life, were undoubtedly built on the banks of rivers and streams He not only needed water to slake his thirst, but had to have it in quantitity to water his fields.

Examination of many sites far from the nearest river suggests they were once on river banks, Miss Mackay found Sometimes a band of silt deposited by a river or remains of a canal bank can be found, showing that water once flowed by that region Boats sketched on a seal or bit of pottery show the ancient residents' familiarity with transportation by water River beds themselves can often be traced because soil beneath where a river once flowed differs in color, texture and composition from the surrounding alluvial soil.

Science News Letter, June 15, 1946

PHOTOGRAPHY

Shutterless Camera For Aerial Mapping

➤ A CAMERA for use in aerial mapping, designed to do away with the necessity for subsequent piecing of photographs together into a mosaic, is the invention on which Russell R. Vought of Beverly Hills, Calif., was awarded patent 2,401,530 Instead of exposing whole areas of film at intervals this camera exposes a very narrow strip through a slit The long roll of film is kept moving slowly past this slit, at speeds varying with the speed of the plane. Thus a continuous record is made of the terrain over which the plane is flying.

Science News Letter, June 15, 1946

RADIO

Television from the Skies

Ultra-short waves follow straight paths, reaching out from 30 to 50 miles. So television is taking to the air to make longer ranges possible.

By A. C. MONAHAN

➤ TELEVISION IMAGES ride on short waves that act very differently from the longer ones used in the ordinary radio broadcast, or in inter-continental signals The result is, television is local, while radio broadcasting is world-wide

With your radio set you can pick up music or talks transmitted from far-distant stations in Havana, Buenos Aires, London, Moscow—practically anywhere on the earth With your television receiving set, however, you can usually pick up pictures from a television station not more than 30 to 50 miles away

This is because the relatively short television waves travel in straight lines through unobstructed paths Ground waves of long-wave broadcasting follow the curvature of the earth for several hundred miles until their intensity becomes too weak for reception Sky waves from a radio station go upward at an angle, and are reflected back to earth by the outer layer of atmosphere that is electrically charged It is these that make it possible to receive broadcasts thousands of miles away.

Waves Don't Bounce Back

The very short waves that carry television images, on the other hand, do not bounce back from the "radio roof" They act like beams of light, travelling in straight lines The practical result is that they can reach just about as far as you can see from the top of the sending tower That is not apt to be more than 50 miles, and is usually nearer 30 This is called the "line-of-sight" distance, and the horizon is referred to as the usual limit of television reception

The higher the transmitting antenna is above the level earth, the farther away is the horizon, and the greater is the area of reception For this reason, television broadcasting stations are erected on high towers on as high elevations as possible But even then, their programs can be picked up by receivers in ordinary homes only within a circle of 30 to 50 miles in radius

The length of a wave dissipated into space by the antenna of a transmitting system is the distance a single wave travels while it is being formed This depends upon the time required to generate a single wave, which in turn depends upon the frequency of the energizing circuit in the transmitter; that is, the number of electrical cycles or vibrations per second

Mountain Peaks Help

An exception is the new television transmission station erected atop Mt Wilson, about 20 miles from Hollywood, Calif, at an elevation of 6,000 feet Because of surrounding lower terrain, it is thought the reception area will be 100 miles in radius, and that this single station will serve all of the southern California coastal area Stations erected on other high isolated peaks may also be able to serve larger areas

Television broadcasting, including the

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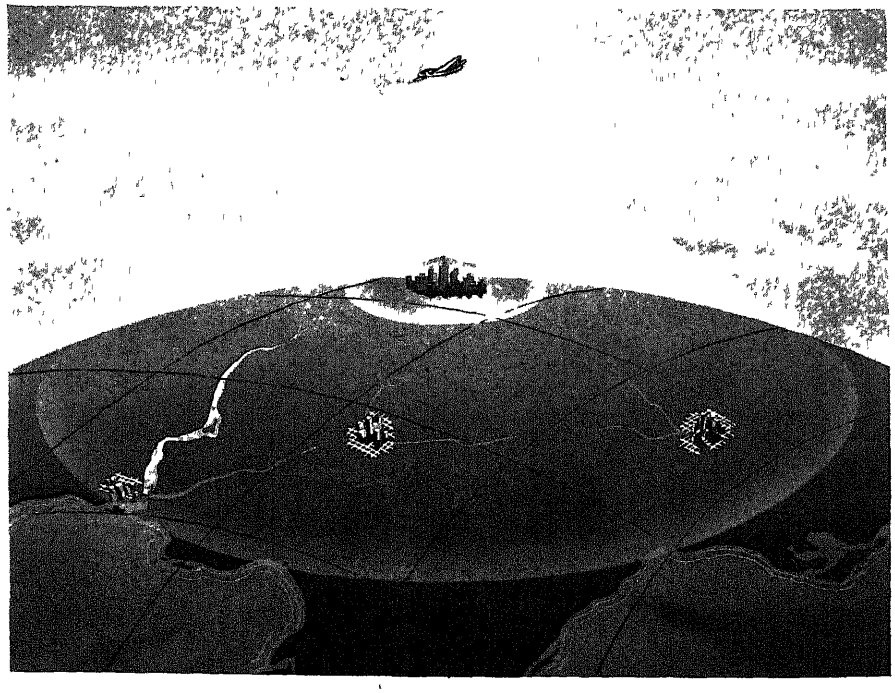
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TAKING TO THE AIR—Television broadcasts beamed from airplanes flying six miles up in the air can supply programs to people living within a radius of 200 miles.

cameras and equipment to give action-talking events as they occur, is costly Large audiences must be served if programs are to be financially feasible The population within a 30 to 50 mile radius is not ordinarily enough The program from a single originating station must be spread over a much greater area How to carry the talking pictures to sufficiently large areas is one of the great problems of the television industry

Systems of Pickup

A system of relay stations seems to be the answer One plan under trial includes ground-based radio relays on towers that will pick up programs from the air and rebroadcast them Another system uses relays fed by coaxial cable from originating transmitters. A third proposes airborne relays carried aloft either by planes or blimps Probably all three will be used eventually

At least two ground-based radio relay systems for airborne television waves are under construction One is between New York and Boston, the other between Chicago and Milwaukee In the first of these installations the relays will be from 30 to 40 miles apart, making eight jumps between the two cities

To help carry the radio waves from one relay to the next, large lenses will be used They are metal lenses that can focus the radio waves in much the same way that a glass lens focuses light In appearance, however, they bear no resemblance to the familiar optical lens

Each is an array of metal plates placed somewhat like the cross slats on a window blind, but designed to focus the radio waves as effectively as a solid lens might focus them if due regard is given to the fact that the edge of the wavefront is advanced, rather than retarded, in transit

Cables Are Expensive

Television images can be transmitted short distances by special telephone wires, but not far because the electrical losses are too great They can be transmitted almost unlimited distances by coaxial cable, however, but coaxial cable is expensive to manufacture, install and maintain When used part time for telephone communication and part time for television, its use is economically feasible

A coaxial cable is a lead-covered flexible tube containing, usually, from six to eight conductors Each conductor is a copper tube about the size of a lead pencil, with a heavy copper wire extending throughout its length and held by plastic disks in its center, out of contact with the tube Each tube can accommodate a television channel or 480 telephone channels

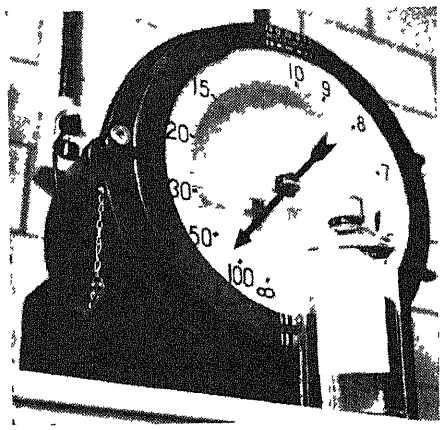
To cover the United States with enough coaxial cable to connect all the principal cities would cost an enormous sum It is estimated that a single coaxial cable across the country, without the repeater stations, would cost $100,000,000 and take five years to complete It would still be only an East-West link, and would provide only a few feeders for North-South zones

Stations in the Air

The plan of carrying television relay stations high in the air by planes or blimps is ingenious but promising, and is a natural development for air-minded America In some ways the airplane plan has advantages over the blimp plan. The planes can ascend to higher levels, and consequently can give television coverage to a greater area The relative merits of the two have not yet been determined

In the plan using airplanes, now under experimental development, giant planes of the heavy bomber or cargo type may be used They will travel in lazy circles five miles or more above the earth, receive programs from ground-based stations and rebroadcast them

It is estimated that a plane in the stratosphere 30,000 feet above the earth



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Do You Know?

When *lawns* are sprayed with the 2, 4-D weed killer to destroy dandelions and plantains, it may be expected that the growth of the grass will be checked somewhat by the spraying, the check is usually only temporary, however

Rat control requires continual attention, rats begin to breed at three or four months of age, the gestation period is about 23 days, the average litter is probably ten, and one female may have from six to ten litters a year

An instrument for *remote measurement* of humidity at room temperatures, developed by the Army, uses two fine wire thermocouples, one of which is continuously wetted by a wick.

In the Dominican Republic, where much *coffee* is raised and used, it is considered bad luck to drink coffee while standing

Abundant quantities of *helium,* the lightweight, noninflammable balloon gas, are now available for industrial and medical applications

Liquid soap can be made from surplus Napalm, a gasoline thickener used in flamethrower fuel, by a process developed by the Army.

would send out short waves that would blanket the earth's surface like a giant inverted ice-cream cone covering an area over 400 miles in diameter This is an area equal to the combined areas of New York, Pennsylvania and New Jersey

Can Also Relay Programs

The system proposes airborne transmitters and relays The same aircraft which broadcasts programs will serve to relay these programs to other transmitting planes Cruising about at 30,000 feet above the earth, seven planes can provide complete New York-Los Angeles broadcasting and relaying coverage Eight additional planes would provide coverage for nearly four-fifths of the country's population.

Relaying between the aircraft is relatively simple since the line-of-sight distance at 30,000 feet is over 400 miles. Moreover, the high altitude minimizes the effects of ground interference which troubles ground transmission.

Proposed system of airborne relays to rebroadcast programs received from ground stations must not be confused with the system, already successfully demonstrated, of airborne cameras and television equipment that take and transmit action pictures, with sound, of events as they occur on the earth below. The television images may be picked up by television receivers within range, or by relay stations for transmission and rebroadcast With this equipment, a military staff 200 miles from the fighting front could view the battle as it progresses

Science News Letter, June 15, 1946

ENGINEERING

Nuclear Energy for Ship Propulsion

➤ AN ATOMIC powered warship could travel a million miles, (back and forth across the Atlantic 160 times) on one fuel charge, Harry A. Winne, General Electric Company vice-president, declares

Ship propulsion is likely to be the first practical power application of nuclear energy, he explained

Since atomic power for marine propulsion could be used more freely than oil so far as weight is concerned, Mr. Winne foresees important increases in the power and speed of any class of merchant or fighting vessel

Science News Letter, June 15, 1946

YOUR
HAIR
AND ITS CARE
By O. L. Levin, M. D. and H. T. Behrman, M. D.

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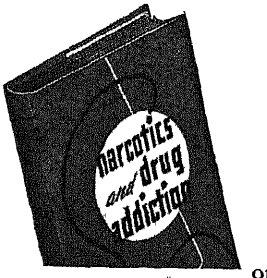
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Rare Addictions

An up-to-the-minute survey of the immense quantities of narcotics and stimulants thrown on the world market through channels legal and illegal.

Narcotics and stimulants are clearly analyzed and described, according to their psychic and physical effects

This book further endeavors to convey a pharmacological and toxicological knowledge, as well as to outline the general medical significance of narcotics and stimulants.

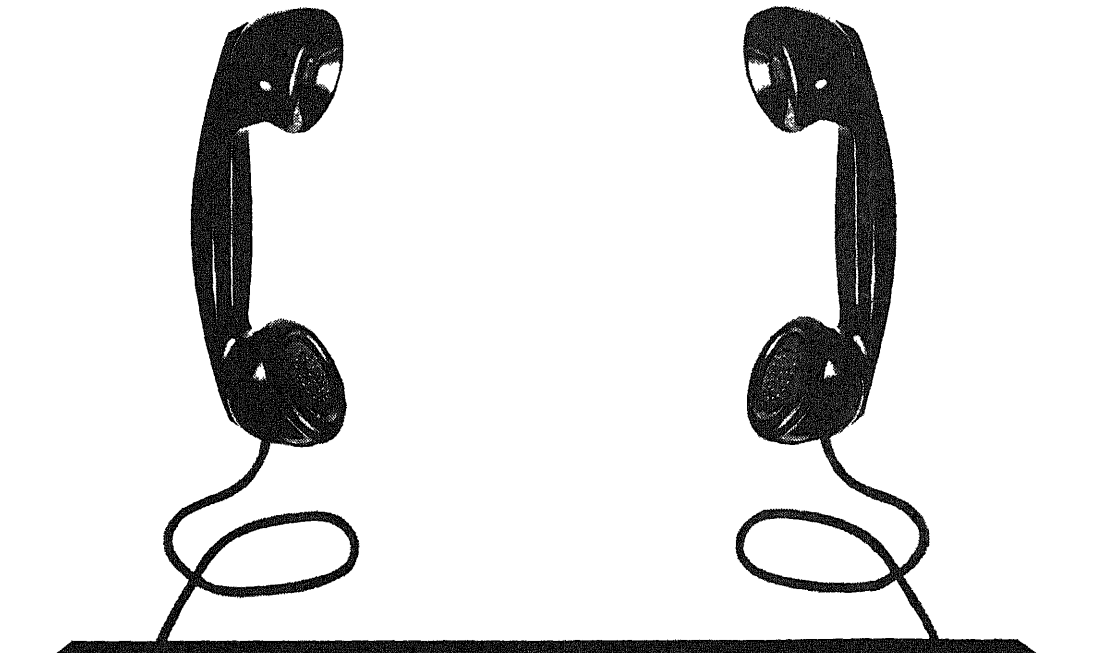
The drug addict is investigated in various case histories; experiments and tests on human beings as well as on animals are cited.

The common components, the manner and method of preparation, are clearly defined, as well as the various stages of the multiple types of addiction, their effects and their cure.

An appendix contains name and subject index, and an extensive bibliography.

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Yes, or alike as two telephone handsets made by the same process. Yet, pins or handsets — no two could ever be made exactly alike Dimensions, weight, performance—all vary every time due to variables in manufacture. How can these variables be *controlled?*

Back in 1924, Bell Laboratories' mathematicians and engineers teamed up to find out, forming the first group of quality-control specialists in history. They invented the now familiar Quality Control Chart, designed inspection tables for scientific sampling They discovered that test data mathematically charted in the light of probability theory were talking a language that could be read for the benefit of all industry.

Western Electric, manufacturing branch of the Bell System, applied the new science to its large-scale production. In war, it was used by industrial and government agencies of the United Nations in establishing and maintaining standards for military matériel. A Quality Assurance Department, a novelty back in the nineteen-twenties, has come to be indispensable to almost every important manufacturer.

Scientific quality control is one of the many ideas of Bell Telephone Laboratories that have born fruit in the Bell System The application of mathematics to production is helping good management all over the industrial world — and furthers the cause of good telephone service everywhere.

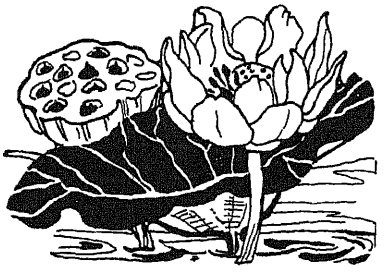
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BIOLOGY

NATURE RAMBLINGS

by Frank Thone



Vegetable Ventilators

➤ DURING THE later months of World War II, new German submarines went into action with high hopes of eluding the ever-watchful eyes of Allied observers in planes, in blimps, on lofty lookout posts of ships They did not need to come to the surface for weeks on end, because alongside the periscope was a tube through which air could be sucked down for their diesel engines and for the crew to breathe

It was a most ingenious device, but after all not original If you will cut through the stem of a waterlily, or a lotus, or almost any plant that grows with its roots under water you will find that it is not solid like the stems of most land plants but that it has one or more holes in it If you split the stem lengthwise you will find that these holes are long open channels They lead down from leaves and flowers clear to the submerged roots

The roots of a plant must have air, just as the leaves do Without it they smother, just as a drowning man really dies of suffocation, because he cannot get air into his lungs

Plants unlike animals do not have an elaborate system of lungs, respiratory muscles and blood corpuscles to carry oxygen supplies to the body's remotest tissues. Their oxygen supplies reach all their cells quite directly. That is one reason why leaves are a plant's most active organs—they are flat and thin, and oxygen from the air does not have to travel far to supply all their cells.

Although the roots of most common plants are underground, they can still get their oxygen. Enough air filters through the myriad crevices between soil particles to take care of that. That is, it does when the soil is in good tilth; if there is too much rain and flat fields are flooded too long most of the plants in them simply die of drowning

Herbaceous plants like waterlilies and arrowleaf are not the only ones that have air-passages in their stems Waterside shrubs like the buttonbush, and even great trees like the pond cypress, have breather systems They differ in details of structure but they all serve the same function in the end

The cypress uses a peculiar contrivance to get air to its roots Every here and there a steeple-shaped structure projects up through the water where the trees stand It is not hollow, like stems of some aquatic herbs, but is filled with a loose, sponge-like woody tissue, through which air can filter without too great difficulty

Science News Letter, June 15, 1946

HERPETOLOGY

Black Widow Spiders Killed by Alligator Lizards

➤ ALLIGATOR LIZARDS, slender rough-scaled reptiles found in southern California, feed on black widow spiders and their eggs Pleading for the life of the snake-like lizards, Dr Raymond B Cowles of the Los Angeles campus of the University of California says they could soon make the dread black widow spider a rarity as they can squeeze into cracks and crevices where the black widow spiders live

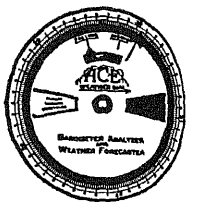
Alligator lizards, that grow 12 to 16 inches in length, are harmless as far as humans are concerned Unfortunately, the common house cat preys upon the lizards about as avidly as the lizard preys upon the spiders

Science News Letter, June 15, 1946

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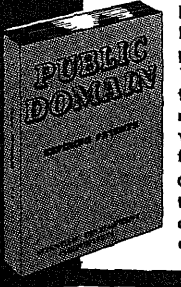
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• Books of the Week •

AEROBIC MESOPHILIC SPOREFORMING BACTERIA—Nathan R Smith, Ruth E Gordon, and Francis E Clark—*Government Printing Office,* 112 p, tables, paper, 25 cents U S Dept of Agriculture, Miscellaneous Publication No 559

BIBLIOGRAPHY OF BIBLIOGRAPHIES ON THE ARCTIC—Rev Artheme Dutilly—*Catholic Univ of America,* 47 p, illus, paper, $1 Publication No I B

COLLEGE MATHEMATICS A General Introduction—Charles H Sisam—*Holt,* 561 p, tables and diagrs, $3 50 A textbook presenting the customary first-year course in college algebra, trigonometry, analytic geometry, and some calculus Adapted to a three, four, or five-hour course for a year

EXPLORING IN SCIENCE—Gerald S Craig and Beatrice Davis Hurley—*Ginn,* 318 p, illus, $1 28 A natural science textbook for use in grade four Includes chapters on astronomy, animals, plants, and a glossary of scientific terms Book 4 in OUR WORLD OF SCIENCE series

GUIDANCE PRACTICES AT WORK—Clifford E Erickson and Marion C Happ—*McGraw,* 325 p, $3 25 A description of specific practices carried on in schools as part of their guidance programs, including material drawn from many types and levels of education and from all parts of the country Suggestions for checking guidance practices and pointers for those who wish to initiate or expand guidance programs

INTERNATIONAL BUSINESS DICTIONARY—Frank Gaynor—*Philosophical Library,* 452 p, $6 The most frequently used commercial and banking terms and phrases given their equivalents in German, French, Spanish, and Italian. Cross indexes in German, French, Spanish, and Italian enable the user to translate from any of these languages into any of the others or into English

MEDICAL SERVICES BY GOVERNMENT Local, State, and Federal—Bernhard J Stern—*Commonwealth Fund,* 208 p, tables, $1 50 A comprehensive summary of the complex and expanding field of government medical services, tracing the changing emphasis and changing points of view concerning the relative responsibilities of local community, the state government, and the Federal Government

THE MEETING OF EAST AND WEST An Inquiry Concerning World Understanding—F S C Northrop—*Macmillan,* 531 p, illus, $6 An analysis of the ideological conflicts of the contemporary world and a suggestion for the resolution of these conflicts

THE MODERN ATTACK ON TUBERCULOSIS—Henry D Chadwick, M D, and Alton S Pope, M D—*Commonwealth Fund,* 134 p, tables, $1 00, rev ed A concise digest of the experience of many workers and of present day practices in controlling tuberculosis This revised edition includes much new material about recent developments in administration and the techniques of control

ON SIAMESE BIRDS—Rudolphe Meyer de Schauensee—*Academy of Natural Sciences of Philadelphia,* 82 p, paper, $2 45 Proceedings of The Academy of Natural Sciences of Philadelphia, Vol XCVIII, 1946, pages 1-82

POSTWAR ISSUES IN THE PETROLEUM INDUSTRY—Walter H Voskuil—*Univ of Illinois, Bureau of Economic and Business Research,* 32 p, tables, paper, free

THE PROLONGATION OF LIFE—Dr Alexander A Bogomolets, translated by Peter V Karpovich, M D and Sonia Bleeker—*Duell,* 93 p, $1 50 The factors involved in longevity, theories of aging, data about ACS (anti-reticular-cytotoxic) serum, told by the discoverer of ACS serum who is director of the Kiev Institute of Experimental Biology and Pathology (For current evaluation of ACS serum, see SNL, April 27, 1946)

THE RADIO AMATEUR'S HANDBOOK The Standard Manual of Amateur Radio Communication—*American Radio Relay League,* 688 p, tables and illus, paper, $1 00, 23rd ed The "bible" of radio hams

REVISED LAPIDARY HANDBOOK—*J Harry Howard,* 220 p, tables and illus, $3 Designed to provide practical instruction in gem cutting for the beginner and the advanced amateur This book supersedes the author's HANDBOOK FOR THE AMATEUR LAPIDARY, and contains information about modern techniques

SCIENCE ALL ABOUT US—Gerald S Craig and Agnes Burke—*Ginn,* 160 p, illus, $1 04 A natural science textbook for use in the earliest grades Many illustrations with simple facts about the seasons, weather, water, animals, etc Book 1 in OUR WORLD OF SCIENCE series

SKIN DISEASES, NUTRITION, AND METABOLISM—Erich Urbach, M D—*Grune and Stratton,* 634 p, tables and illus, $10 A comprehensive survey of the interrelationship between dermatology and internal medicine, with particular reference to the nutritional, biochemical, and metabolic aspects

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UNDERSTANDING MICROWAVES—Victor J Young—*Rider,* 385 p, diagrs, $6 The fundamental problems encountered in the field of ultra-high frequency research and production and how they are surmounted

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WOMEN AND WORK—Gertrude Williams—*Duell,* 128 p, illus, $2 50 An attempt to disentangle the issues involved in deciding women's place in the field of employment now that the special wartime emergency is over

WORKING WITH SCIENCE—Gerald S Craig and Katherine E Hill—*Ginn,* 384 p, illus, $1 36 A natural science textbook for use in the middle grades Chapters on the nature of heat, the changing seasons, the growth of plants, the action of magnets, etc Book 5 in OUR WORLD OF SCIENCE series

Science News Letter, June 15, 1946



ELECTRONIC EQUIPMENT AND ACCESSORIES

By R C Walker

Offers a wealth of specific information about the various applications of electronic devices and their accessories Every electrical engineer, mechanic and student wishing to keep in touch with modern progress will find this a worthy addition to his technical library

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PLASTICS—Scientific and Technological

By H. Ronald Fleck

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RUBBER IN ENGINEERING

A Symposium based on research by the Imperial Chemical Industries, Ltd

This book has been designed to interest a wide variety of readers Its main purpose is to furnish engineers with a general survey of the information available on the fundamental properties of rubber Complete with graphs and tables

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New Machines And Gadgets

⚙ *SHOE HEEL, recently patented, consists of two parallel U-shaped metal springs connected at their open rear ends by crossbars The upper shafts of the springs carry a plate to attach to the shoe The heel is claimed to be resilient and comfortable to wear.*

Science News Letter, June 15, 1946

⚙ *SPHERICAL ROLLER BEARING, a new thrust type, is claimed to combine the triple features of high-load capacity, speed and low temperature The bearing's self-aligning principle compensates for any shaft deflections and permits heavy loads to be evenly distributed*

Science News Letter, June 15, 1946

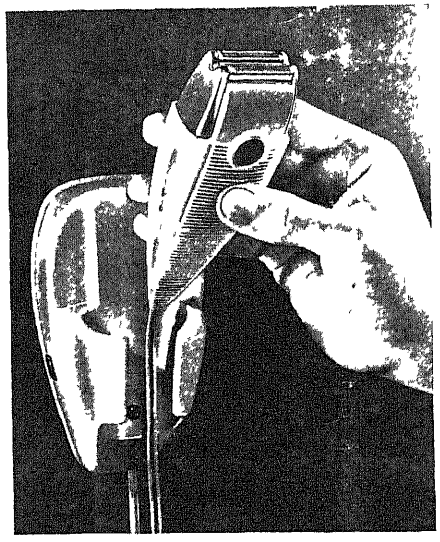
⚙ *MAGNETIC LINKS placed in transmission systems record the current in lightning flashes from thunder clouds If a streak of lightning passes through the system, the link is magnetized in proportion to the highest value of the current in the lightning bolt*

Science News Letter, June 15, 1946

⚙ *ELECTRIC CLOCKS of three types are available to waken a sleeper One flashes a bedside lamp, a second turns on a radio program, and a third operates a buzzer that can be modulated in loudness. The first two have buzzers also, they sound soon after the light or radio is turned on.*

Science News Letter, June 15, 1946

⚙ *PLASTIC WALL HOLDER, for one type of electric razor, automatically reels within itself the electric cord when*



the razor is put in it When the razor is taken from the holder, shown in the picture, the electric current is automatically turned on, when the shaver is returned, the current is cut off, and the cord disappears

Science News Letter, June 15, 1946

⚙ *FACSIMILE broadcasting equipment, that will print in the home by radio four standard letter-size pages of text, maps or photographs during a 15-minute broadcast, is but slightly larger than a portable typewriter It may be attached to a radio set already in the home or built into a radio console by the manufacturer*

Science News Letter, June 15, 1946

⚙ *GARDEN HOE, a four-in-one tool, is a combined hoe, cultivator, rake and weed puller It has the familiar hoe blade on one side, on the other are five broad-based, sharp-pointed teeth Made of strong carbon steel, it is light in weight*

Science News Letter, June 15, 1946

⚙ *HOME FREEZER, of 240 pounds average capacity, is finished in enamel and stainless steel for installation in a modern kitchen It maintains a temperature of zero Fahrenheit in all climates Heat from the compressor is conducted to a defrosting tray to speed thawing out food when needed.*

Science News Letter, June 15, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St, N W, Washington 6, D C, and ask for Gadget Bulletin 315.*

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Question Box

AERONAUTICS

What is the possible speed of the Navy's "flying stovepipe"? p 371

What is the name of the new Army jet fighter? p 376.

In what way does the "rainmaker" aid in safer airplane landings? p. 373.

ARCHAELOGY

What became of the ancient cities when rivers changed their courses? p 377

ASTRONOMY

How many people will be credited with finding the bright new comet? p. 372.

ASTROPHYSICS

Why is it a good idea to put more windows on the south side of the house? p. 376

BIOLOGY

In what way does the water lily get air to its roots? p. 382

ELECTRONICS

In what field of peacetime research will the magnetic detector be used? p. 374.

FOOD TECHNOLOGY

In what country do they freeze potatoes to preserve them? p 374.

GENERAL SCIENCE

What are the seven blind spots yet unsolved by science? p 373

HERPETOLOGY

What reptile kills the black widow spider? p 382.

NUTRITION

Baby food will be preserved by what method in the near future? p 373

What kind of diet will prevent running fits in dogs? p. 376

RADIO

Through what country are radio broadcasts from New York to Moscow relayed in order to avoid the magnetic storm area? p 377.

TELEVISION

How will the airplane help in making television programs available to people over a larger area? p. 378.

Where published sources are used they are cited.

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13 MAR 1952

IENCE NEWS LETTER

Vol. 49, No. 25

HE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 22, 1946



Lothian Library,
Agricultural Research Institute
New Delhi.

Birthplace of Radioisotopes

See Page 387

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946



Launching a New Era . . .

Nearly half a century ago, George Westinghouse developed a revolutionary steam turbine that supplanted the steam engine as a driving force for central station generators

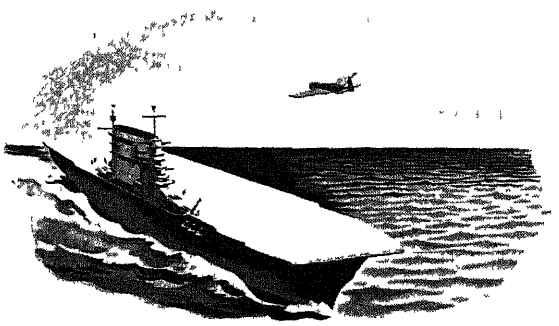
Always vitally interested in better transportation, Westinghouse quickly realized that here was the *ideal power source* for ship propulsion Because of its compactness, the steam turbine would permit more space for fuel reduce weight and vibration assure far greater fuel economy

But there was one engineering problem that no one had yet solved—an efficient means for coupling the rapidly whirling turbine shaft with the ship's slow-moving propeller

George Westinghouse supplied this missing link — with the help of marine experts, Rear Admiral Melville and John H MacAlpine — by developing the first practical *gear-reduction turbine drive*

After six long years of study and experiment, Westinghouse built two 3250 horsepower geared turbines which were installed in the collier, U S S Neptune — launched on June 21, 1912

The trial run was a notable success It was one of the great achievements of George Westinghouse's remarkable career—*for it initiated a new epoch in marine propulsion*



Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TODAY — The world's greatest warships and maritime vessels are powered by reduction-geared turbines, pioneered by George Westinghouse in 1912 Many of them are driven by Westinghouse propulsion equipment Recently, the U S Aircraft carrier Lake Champlain crossed the Atlantic at the *record-breaking* average speed of *32 048 knots.* The geared turbines in the Lake Champlain—as well as in all other Essex class carriers—proudly bear the nameplate of the Westinghouse Electric Corporation

Tune in TED MALONE—*Monday, Wednesday and Friday, 11 45 am, EDT, American Network*

PHYSICS

Radioactive "Tracers"

Radioisotopes, product of atomic energy development, to allow inquiry into disease causes, photosynthesis and life processes. About 100 isotopes are available.

See Front Cover

➤ EXPLODING CHEMICAL elements, made synthetically in chain-reacting atomic energy piles, which will work for peace instead of war, are the products of a new manufacturing enterprise announced by the War Department's Manhattan Engineer District, Oak Ridge, Tenn (*Science,* June 14)

They are what are called the radioisotopes of the common elements Introduced into familiar substances, these special synthetic kinds of radioactive atoms can be traced through everyday but little understood processes They can be tracked by means of the rays they give off

By such "tracer" studies scientists are making headway in understanding how plants build our food out of water, air and sunshine, how compounds like the sulfa drugs combat disease, how industrial chemical reactions take place, and how life processes are passed on from generation to generation

New Venture

The new manufacturing venture, resulting from atomic bomb research, undertakes to supply to qualified research organizations the radioisotopes which come out of the Oak Ridge chain-reacting piles as fission products of uranium Many of them were troublesome by-products of the reactions that produced material for the atomic bombs Now the men who run the piles are looking for the best uses for them

Since recovery of the minute amounts of many radioactive elements which occur under the conditions which make the bomb elements has not proved practical, experiments have been directed toward the production of the particular isotopes most in demand for research These are radioactive forms of carbon, sulfur, phosphorus and iodine All these are furthering new knowledge of life processes and promise better ways of conquering disease

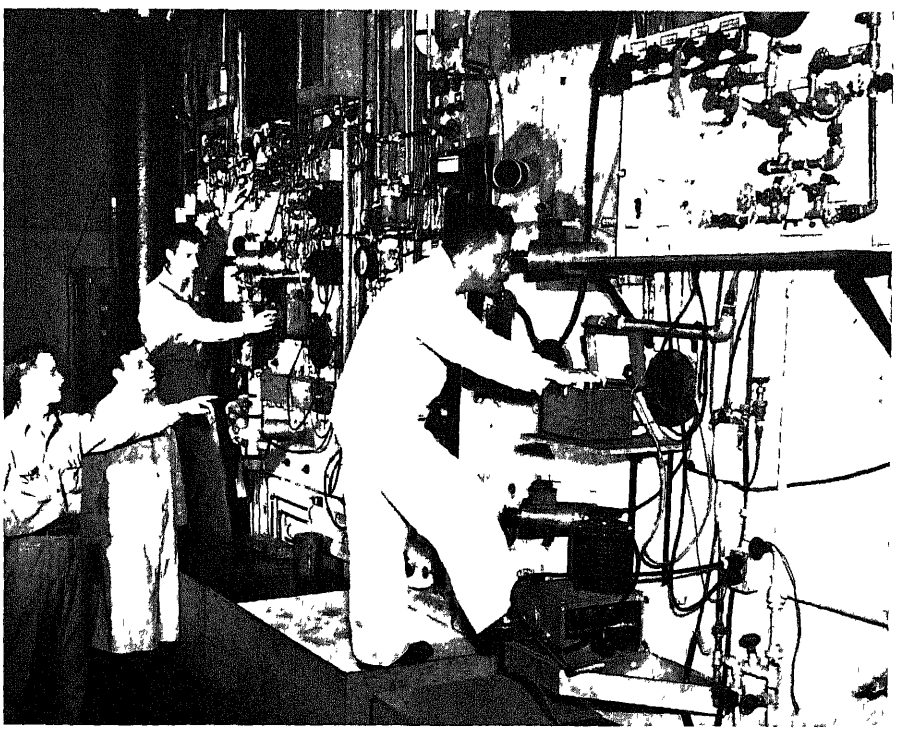
Possibilities of isotope production are, however, by no means limited to these elements Over 400 man-made radioactive isotopes of the 96 elements are known, and the scientists at Oak Ridge are ready to begin negotiations about supplying any of them with a half-life of more than 12 hours

Under the program announced, approximately 100 radioactive isotopes will be obtainable in varying quantities Some of the most important of these include carbon 14, sulfur 35, phosphorus 32 and iodine 131. The numbers following the name of the element refer to the mass of the isotope, that is, to the total of protons plus neutrons in the nucleus Ordinarily stable carbon consists of isotopes of mass 12 and 13, sulfur of 32, 33 and 34, phosphorus of 31 and iodine of 127

Since carbon is one of the principal elements found in organic material, the isotope carbon 14 is expected to give great impetus to the study of all organic processes, including the mechanism and growth of normal and abnormal tissues and all plant and animal functions In the medical field, at least initially, isotopes will yield their greatest benefits not directly in treatment of disease but as tools for finding the causes of diseases.

Phosphorus, which is important in plant and animal metabolism and human hemotology, is also expected to reveal many biological secrets through experimental use of its isotope—phosphorus 32 At the same time, sulfur 35 may be used in tracing reactions of sulfa drugs Radioiodine is valuable because of its specific incorporation in thyroxin and thus can be used to study functions of the thyroid gland These isotopes may also be useful as tracers in industrial chemistry and metallurgy

The radioactive products have been classified in four groups In Class A they place those whose long half-life permits stock-piling These the laboratory will have usually on hand Isotopes whose radioactivity decays more rapidly, so that they can be made but not stock-piled, are listed in Class B These can be made to order Isotopes in Class C are seldom on hand, and are produced on an experi-



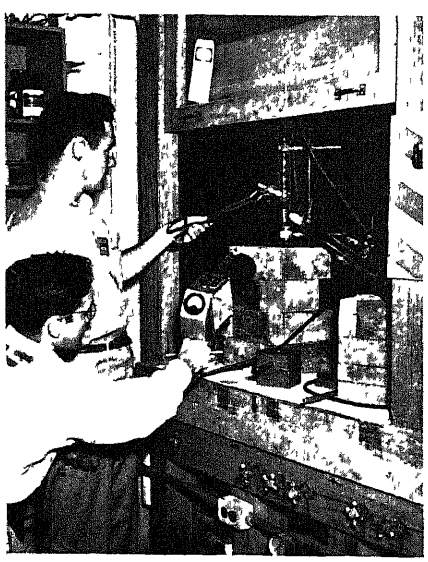
Clinton Laboratory Photos

CONTROLS OF ATOMIC PILE—Watching and controlling the "hot" operations that separate desired fission elements from the uranium pile. Two-foot thick concrete walls protect the scientists. This particular atomic pile is not making plutonium but is being used to obtain radioisotopes used in scientific experiments.

mental basis only Those marked Class D can be made, but with difficulty.

Many months of coordinated effort among atomic scientists at various Manhattan Project facilities preceded the release of the radioisotopes for experimental work Most of the radioisotopes will be prepared at the Clinton laboratories at Oak Ridge operated for the Army by the Monsanto Chemical Company, but the bombardment facilities of the Hanford Engineer Works at Pasco, Wash, now operated by du Pont, to be taken over by General Electric Company about Sept 1, will also be used Research will be conducted by the Argonne National Laboratory, which is University of Chicago operated for the Army and also at the University of California and Iowa State College

The isotope distribution will be supervised by an advisory committee nominated by the National Academy of Sciences, with Dr Lee A DuBridge, new president of the California Institute of Technology now at the University of Rochester, as chairman Dr K. T Bainbridge of Harvard is sub-chairman of allocation, while all requests for application of radioisotopes for human medical problems will flow through the hands of Dr. Andrew Dowdy of the Universisty of Rochester.



IODINE FROM TELLURIUM—A sample of radioactive iodine, destined for medical investigational use, is about to be extracted chemically from tellurium bombarded in the atomic pile. This activated sample has become sufficiently decayed in activity to be handled with short tongs and small shielding.

The Manhattan District's isotopes branch is headed by Dr Paul C Aebersold, with Dr W E Cohn as chief of the radioisotope development section and Dr J R Coe, director of the chemistry division

Methods of Producing Isotopes

Several methods are available for making radioactive isotopes The cyclotron, original apparatus for atom-smashing, and its younger sister, the betatron, are versatile in the variety of radioisotopes they can turn out, because they can utilize different atom-bombing projectiles at different energies The chain-reacting pile works by slow neutron bombardment, and can produce isotopes by only two processes, fission and gamma ray radiation, but the yields of elements so produced are enormously greater

The method of producing any isotope must vary with the quantity wanted and the uses to which it is to be put For some purposes a minute quantity is sufficient Some uses would require a high degree of purity, while for others admixture with other isotopes of the same element or with considerable quantities of different elements might not be considered undesirable In general, the Manhattan Engineer District expects the cost of their isotopes to be cheaper if the users will take them as they come from the pile

The photograph on the cover of this SCIENCE NEWS LETTER is the first picture of an atomic energy pile at Oak Ridge to be released by the Manhattan District Radioactivated material is being removed from the pile at the end of a neutron bombardment period The bombarded sample has just been lifted with the long holder from the block that has been pulled from the pile The pile itself, which is not operating, is concealed behind the thick concrete wall The sample's radioactive strength is being checked with a counter in feminine hands at the right

Science News Letter, June 22, 1946

MEDICINE

Vaccine for Streptococcal Infections a Possibility

➤ FIRST STEPS toward a vaccine for protection against the hemolytic streptococci which cause dangerous sore throats and other serious illnesses were reported by Dr. Lowell A Rantz, of Stanford University hospital, at the meeting of the American Federation for Clinical Research

Preliminary tests show that antibodies against these germs can be produced in the blood of vaccinated persons Whether or not this means that the vaccinated persons will be immune to attack by the germs is not yet known

Some of the men vaccinated had severe reactions with doses of vaccine that may be too small to stimulate production of antibodies Several became increasingly sensitive as succeeding doses were given

These efforts to develop a vaccine against streptococci were made under the auspices of the Army's Commission on Hemolytic Streptococcal Infections when it was found that sulfa drug prophylaxis against these germs proved to have limited usefulness

Science News Letter, June 22, 1946

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PUBLIC HEALTH

New World Health Plan

Improving health in every part of the world and controlling the spread of disease at its source will be aims of the UNO Health Organization.

➤ THE NEW IDEA in preventing the international spread of disease is to control it at its source It got its first hearing at the conference on June 19 to form the UNO Health Organization

Strengthening health services in every nation is on the program so that, for example, the health department of Nigeria could protect its own people and world travelers against yellow fever as effectively as New York City protects its millions of residents and visitors from typhoid fever

In the past when nations took joint measures for health protection, the emphasis was on checking the importation of disease Regulations, which became treaties between nations, were drawn up to keep diseases such as smallpox, cholera, plague and yellow fever from being imported into nations free of these health menaces

Quarantine today is outmoded Jet plane travellers of the future will balk at spending as much as 40 minutes in quarantine, much less the traditional 40 days or the two weeks that was customary even in fairly recent times

Also outmoded, it seems to health authorities, is the necessity for having legislative bodies, such as the U S Senate, ratify vaccines against yellow fever and typhus fever Yet that, in effect, was necessary when this and other nations signed the International Sanitary Convention for 1944 which provides for isolation of persons traveling by air who do not hold valid anti-yellow fever vaccination certificates from yellow fever regions

Contagious diseases that might spread from one nation to another are not the only health problems that have international effects Scientists and thousands of lay persons have learned in recent years that good health depends on good feeding as well as on germ fighting People who are not adequately nourished are likely to be irritable and anxious or fearful Sick minds in one part of the world can affect all the rest of us just as much as uncontrolled yellow fever in one part of the world can affect the rest of us.

Such effects cannot be kept from spreading by quarantine methods Like germ-caused plagues, these must be controlled at the source Strengthening of health and medical services is seen as one important method of stopping the spread of sick ideas by removing the ill health that may cause them

To put the new medical and health knowledge into practice on a world-wide scale, UNO plans a new International Health Organization A conference to work out the details started on June 19

The new emphasis on improving health in every part of the world will not mean abandoning older international health activities Collecting and disseminating information on foci of epidemic diseases, once a function of the Office International d'Hygiene Publique at Paris and more recently of UNRRA, will probably be taken over by the new International Health Organization and may be the first of its activities to be started

Sanitary Convention measures for stopping the spread of contagious diseases between nations, advisory and scientific activities of the Health Section of the League of Nations, and perhaps the cooperative international health activities of the Pan American Sanitary Bureau may all become functions of the new organization

Science News Letter, June 22, 1946

CHEMISTRY

Chemical Kills Insect Larvae But Not Fish

➤ POSSIBILITY of killing mosquito larvae, or "wigglers" without damaging fish and frogs, a risk that is run when DDT is used, is held out as a result of experiments by Dr E D Goldsmith and Prof M H Harnley of New York University. Working with thiourea, a chemical widely used in industry, they discovered it to be a good insecticide, though its effectiveness differed even among varieties or strains within the same insect species

They found, too, that thiourea will kill the larvae of insects as well as adults.

Science News Letter, June 22, 1946

METALLURGY

Germany's Progress in Use of Magnesium Alloys

➤ WHILE AMERICAN engineers were quite familiar with German progress in the use of magnesium up until the start of the European war, important wartime progress was closely guarded, but is now known as a result of American investigations on the ground

A report by the Office of the Publication Board of the Department of Commerce includes valuable data on German magnesium alloys, their uses and methods of fabrication American manufacturers will find them useful Germany developed magnesium alloys, it is said, earlier than America because of a shortage of raw materials from which to obtain aluminum.

Among novel developments in the German industry was the use of anhydrous ferric chloride to refine the grain of magnesium alloys containing aluminum This chemical, in powdered form, was packaged in moistureproof paper, with just enough in each package to treat one batch of metal The powder was lowered into the metal in a cylindrical steel basket at the end of a long steel sweep Workers were protected by steel shields No accidents or explosions were reported, the American investigators state

In addition to processes well-known in America, the Germans developed a water dip process for making ingots This employed a hot, thin-wall mold After removal from the mold, each ingot was sliced for fracture examination and scalped all over German authorities claim this process produces better uniformity of composition, less waste and consistent quality. Its principal disadvantage is its higher cost

Among other matters covered in the report, which was made by R T. Wood, investigator for the Technical Industrial Intelligence branch of the Commerce Department, is a 30,000-ton forging press for magnesium forgings, said to be the largest and most powerful in the world The press was equipped with eight supporting columns and stood 85 feet above the floor Its last war job was forging aluminum wing spar caps, 20 to 35 feet long, for aircraft

Science News Letter, June 22, 1946

In early American days, *housewives* dyed cloth a dark red with the liquid of the common beet, boiled until the beets lost their color

OPTICS

New Microscope

Sharper images are possible and living cells may now be examined through new phase-difference microscope. The use of two rings makes this possible.

➤ LIVING CELLS can be spied upon without killing through use of a phase-difference microscope seized from the Germans as scientific booty of war.

Based on a Dutch idea of a decade ago, the new kind of microscope gives unusual details by use of two rings, one of which speeds up a little the light passing through it Although the principal American microscope manufacturers had been experimenting successfully with similar devices, two instruments now in this country will help in securing production for research use in about a year

The phase-difference microscope shows up minute differences in structure not visible before Scientists are finding it particularly useful in the study of transparent living objects. It brings out details without preliminary staining with dyes, which kills the cells Identifying minerals in rocks and detecting minute imperfections in gunpowder are other jobs it can do.

One of these microscopes was brought back from Germany by Gustave Guellich of the Technical and Industrial Branch, Office of the Publication Board, Department of Commerce It is now at the National Bureau of Standards where Dr Charles P Saylor is studying how it is made and what it will do

The other phase-difference microscope was secured by Col. Arthur Brice of the Chemical Warfare Service when he visited the Zeiss Optical Works at Jena, Germany, in the Russian Zone of Occupation At the same time Col Brice secured a motion picture, taken with the microscope, of the division of living cells of a grasshopper, giving details never before visible Under the auspices of the Veterans' Administration, he is now showing the movie and microscope to physicians and other selected groups

Two rings, one built in the microscope objective and the other used to control the light reaching the specimen, are responsible for the sharp, intensified image. A transparent ring is used between the specimen and the mirror reflecting the light that is to illuminate it. Here all except a ring of light is blacked out and only a hollow cone of light is focused on the specimen to be studied

The other ring, built into the microscope lens, is inserted where the two lenses forming the objective are cemented together Used in place of some of the cement, it consists of a ring of metal of transparent film Light going through this ring is bent a little and speeded up, perhaps a quarter of a wavelength

Light coming directly from certain parts of the specimen is reinforced by light from other parts that has been bent by the ring, resulting in an image of increased contrast reaching the eye The particular parts of the object to be reinforced depend upon the refractive index of the ring film in relation to the cement used in the objective

Before use, the position of the phase-difference ring must be adjusted so it just matches that of the other ring The microscope, however, can be used with or without the phase-difference apparatus Although the ring is built into the objective, it cuts down so little light when its sister ring is not in use that the image is changed but slightly

Microscopes of this type were first described about a decade ago by the Dutch scientist F Zernike A number of years passed, however, before two Germans made production commercially possible

Science News Letter, June 22, 1946

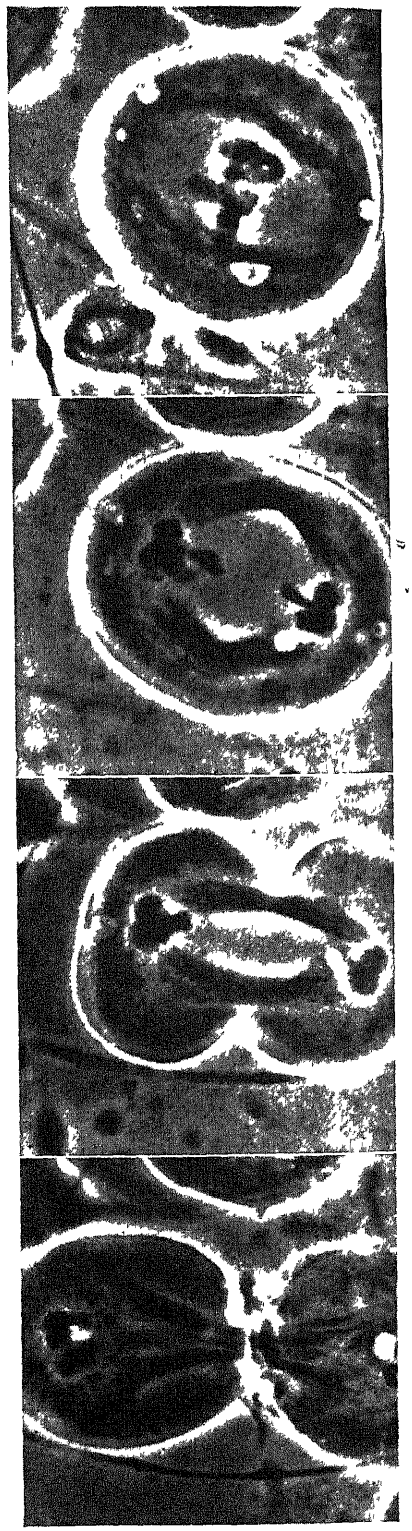
CHEMISTRY

New White Paint Developed During War

➤ INDUSTRY NOW has a new kind of glistening white finish to apply to all sorts of surfaces It is a heat resistant paint that has properties between those of baked enamel coatings and ordinary paints

A new silicone resin that becomes hard and durable under the influence of heat, was developed by the Dow Corning Corporation during the course of experimentation upon the unusual war-born compounds made from sand, coal, oil and brine.

Science News Letter, June 22, 1946



***CELL DIVISION**—All growth takes place by the division of cells. Cell from a grasshopper's body splitting into two parts, each of which will be a complete cell, is shown in this series. Cell division can be traced with the phase-difference microscope without having to kill the cells by staining.*

CHEMISTRY

Atomic Bomb Chemistry

Background you will need in connection with the Bikini test

➤ STARTING with the knowledge that one kind of uranium could be split or fissioned with release of energy while another and most common sort of uranium could not, separation of the two kinds of uranium was a major task in the early stages of the atomic energy researches

In order to make the fission reaction in uranium 235 self-sustaining, it was found necessary to separate uranium 235 (less than ½% in any uranium sample) from the more abundant isotope uranium 238 (more than 99%) The more common kind prevents the chain reaction by absorbing neutrons.

An enormous isotope separation plant, using gaseous diffusion methods, was erected at Oak Ridge, Tenn Much of the experimental work for the whole project was done there

Research on uranium 235 fission, using heavy water (D_2O) as the moderator, slowing down the neutrons, was under way in both England and Germany in 1939 American scientists substituted specially purified graphite for heavy water

Two new elements, heavier than uranium 92, both of which were "made to order" and neither of which was known to exist in nature, played an important part in the atomic bomb researches and manufacture These were elements 93 and 94

Formation of element 94 from uranium 238 by neutron capture was effected in the Radiation Laboratory of the University of California in 1941. The new element was found to undergo slow neutron fission like uranium 235 It was named plutonium (Pu)

Plutonium, radioative but approximately as stable as radium, was obtained from uranium 238, element 92, by way of the intermediate short-lived element 93, named neptunium (Np) discovered in 1940. Uranium 238 changes to neptunium and neptunium to plutonium by beta-ray transformation.

Manufacture of plutonium from uranium 238 allowed utilization of the inert uranium isotope for atomic power purposes. It allowed the advantage of sharp chemical separation of different elements instead of the tedious diffusion methods of isotope separation

Thus transmutation, for centuries the alchemists' goal, became the method of choice of the group of scientists who worked out the chemistry of the atomic bomb

Here the knowledge and skill of chemists who had studied the behavior of radium and other radioactive elements were put to good advantage

It had been found in work with such elements that their weight and their chemical nature depend on two kinds of minute particles which make up the hearts of their atoms

The number of one kind of particle, the proton, in the atom heart is responsible for the nature of the element. One proton makes hydrogen, 26 protons make iron, 92 protons make uranium The other kind of particle in the atom heart is the neutron Uranium 235 has a net result of 92 protons and 143 neutrons, adding up to 235, according to the chemists' calculations, while uranium 238 has three more neutrons than its lighter isotope

The two uraniums had to be separated, because only uranium 235 would split up the way the scientists wanted it to for use in the atomic bomb. Uranium 238 would not By lucky chance, the very property of uranium 238 which made it useless for the purposes of the bomb provided the clue which was the best solution of the separation problem

The more plentiful form of uranium could be made to undergo transformation into another kind of element by first adding to the nucleus of its atom a neutron, to make it so heavy that it would become unstable, then by allowing this heaviest uranium atom to shoot an electron out of its structure. This loss of electrons from the total quantity of uranium showed itself as a phenomenon familiar to scientists as the beta ray. It is the peculiar nature of radioactive elements to change into something else when they emit beta rays, and that something else is, oddly enough, not a lighter but a heavier element.

Accordingly, when uranium 239, formerly the heaviest known element, emitted its beta ray, it changed into a still heavier element, neptunium Neptunium proved to be a rather unstable element, and emitted a beta ray in its turn This change in the atom turned neptunium into another new element, plutonium The names of these three elements are taken from the three farthest planets of our solar system

Plutonium turned out to be a fairly stable element, about whose chemical properties enough was soon learned to prove that chemical separation of this new material from its parent uranium would be a relatively easy task Plutonium does not readily follow the pattern by which it was formed, but makes the opposite transformation by which it gives off an alpha ray and becomes uranium 235. This, however, happens so slowly that there is plenty of time for the atom-splitting reaction of plutonium to do its work

In the course of the researches it was also possible to make for the first time two heavier transuranium elements, numbers 95 named americium and 96 named curium, by bombardment with high-energy helium nuclei or alpha particles

Production of materials for atomic bombs was at first planned to be located at the Clinton Engineer Works at Oak Ridge, Tenn Later the plant for full scale manufacture of plutonium was built at Hanford, Wash, and the bomb laboratory was located at Los Alamos, N M

Science News Letter, June 22, 1946

MEDICINE

Vaccination Protects Against Tuberculosis

➤ B C G VACCINATION against tuberculosis is protecting a large proportion of nurses and tuberculosis sanatorium employees in Saskatchewan, Can, from getting the disease from patients, Dr R G Ferguson, director of medical services and general superintendent of the Saskatchewan Anti-Tuberculosis Association, reported at the meeting of the National Tuberculosis Association.

Tuberculosis cases among nurses were reduced to one-fourth and among employees to one-fifth the number that had occurred before the vaccination was instituted in 1938

B C G is made from living tuberculosis germs which have been greatly weakened in their disease producing capacity. It does not give 100% protection but has been found safe by the Canadian users and even when it did not prevent tuberculosis, it reduced its severity.

A serious situation which had been developing with regard to excessive tuberculosis among nurses and sanatorium employees no longer exists

Science News Letter, June 22, 1946

ENGINEERING

Navy's Future Subs May Use Atomic Power

➤ ATOMIC POWERED navies of the future will make the submarine a major fleet unit of greater importance than ever before, Rear Adm H G Bowen, chief of the U S Navy's office of research and inventions, predicted in outlining the Navy's plans for the development and use of atomic energy

Even with the present state of atomic energy development, Admiral Bowen described the installation of atomic power for submarines as "a very attractive proposition"

"Since oxygen or oxygen-bearing fuel will no longer be required, we will be able to realize submerged speeds, and submerged radii of action, which will put the submarine in a distinct class by itself, and make it a major combatant unit," the Navy research chief declared

"Its development into a much larger vessel, capable of successfully carrying out many missions, is clearly indicated," he said

Terming the Navy the greatest single user of power, Admiral Bowen warned that unless the use of atomic energy is faced "in the grand manner, we will fall flat on our faces"

"The Navy has no time to lose in adopting atomic power for surface ships and particularly submarines," he added

On Navy ships, he foresaw atomic piles replacing boilers to produce steam for driving turbines and reciprocating engines Citing speculation that atomic piles may not be expected to weigh less than 100 tons, the Admiral pointed out that present weights of power units in Navy ships far exceed that amount

Science News Letter, June 22, 1946

MEDICINE

Mobile X-Ray Machines Help Fight Tuberculosis

➤ X-RAY MACHINES are taking to the road to help wipe out tuberculosis Mounted in buses or trailers, these units roll along the highways from one village or small town to another, where they help to find unsuspected cases of the white plague.

Each case discovered and brought under treatment means not only a chance for recovery for that patient but the breaking of one more link in the chain by which the disease spreads to new victims.

Surgeon General Parran of the U S Public Health Service has recently accepted a new mobile X-ray laboratory made by General Electric X-ray Corporation in Chicago

In Buffalo, N Y, members of the National Tuberculosis Association have viewed a similiar X-ray unit on wheels made by Westinghouse Electric Corporation

Advantage of these mobile units is that they can go into rural areas too far from medical centers for the population to be X-rayed and too small to afford an X-ray unit of their own

The unit the Public Health Service has purchased at a cost of $18,000 can X-ray as many as 60 persons per hour In actual service in the country, it is expected to X-ray 100 persons daily This means that one or two previously unsuspected cases of tuberculosis could be found each day

Army and civilian experience with mass chest X-ray procedures in recent years has shown that 12 cases of tuberculosis are found in every 1,000 adults X-rayed The annual death toll of the disease in the United States is 55,000 Half the victims are between 20 and 44 years of age

Science News Letter, June 22, 1946

HORTICULTURE

Corn Severely Damaged By Japanese Beetles

➤ JAPANESE BEETLES often damage corn severely by eating the silk as fast as the ears are set In this way fertilization of the kernels is partially prevented and grain production reduced, says B F Coon, entomologist of the Pennsylvania State College's corn and tobacco research laboratory at Lancaster.

The insects cause severe injury if they feed on a silk within about six hours after hand-pollination, Mr. Coon stated Some corn hybrids seem less subject to this type of injury than others Sweet corn as well as field corn may be damaged

When Mr. Coon simulated the damage done by Japanese beetles by cutting the silks and a half-inch of husk from ears six hours after hand-pollination, the injury to the corn was typical of that caused by the insects When the cutting was done seven hours after pollination, however, little damage resulted. Presumably the pollen tubes had grown down past the cutting point in seven hours.

Science News Letter, June 22, 1946

IN SCIENCE

INVENTION

Conical Rotating Valve For Combustion Engines

➤ AN INTERESTING effort to get away from poppet valves on internal combustion engines is represented in two patents granted to Waldo G Gernandt of Detroit, on a conical rotating valve that fits into the cylinder head

The cone of the valve terminates in a stem by which it is suspended from the top of the cylinder head, and which serves as bearing and as means of rotation, through suitable gear connections

A wide passage is cut through the cone from its base to one side The upper opening receives the fuel-air mixture when it is turned opposite the intake port, when turned to the exhaust port it permits the scavenging stroke of the piston to clear out the combustion products When the opening is turned to face the spark plug, the cavity within the cone serves as the ignition chamber

Special features on which the patents are based are forced oil lubrication, with a suction pump to remove excess oil, and provision for cooling The two patents, Nos 2,401,630 and 2,401,631, are assigned to the Briggs Manufacturing Company

Science News Letter, June 22, 1946

AGRICULTURE

Grain Sorghums Important Crop

➤ GRAIN SORGHUM promises to become one of the great agriculture crops of Texas, Oklahoma, Kansas, New Mexico, Colorado, Nebraska, Missouri and Iowa it was predicted at the Second Southwest Chemurgic Conference by Terris A Manley of Phoenix, Ariz

One of the reasons for increased acreage of grain sorghums is that due to mechanical handling, from soil preparation to harvesting, one man alone can produce 160 acres of this crop A minimum amount of moisture is needed adapting it to the drier areas

Whisky and beer malt can be made in part from grain sorghum, while a starch that replaces imported cassava root for tapioca manufacture comes from the waxy types.

Science News Letter, June 22, 1946

E FIELDS

GENERAL SCIENCE

Gigantic Research Center For Automotive Problems

➤ RESEARCH and engineering work on the mechanical problems of the automobile business will occupy the largest portion of gigantic new laboratories and experimental shops to be erected by the Ford Motor Company at Dearborn, Mich.

The announcement was made June 4, the 50th anniversary of the day that the original Henry Ford drove the first Ford car through downtown Detroit The center is dedicated to him, and to his son, the late Edsel B Ford

Construction will start as soon as materials are available When completed, it will probably be the largest development of its kind in industry. Eight buildings are to be erected at an estimated cost of $50,000,000 They will be grouped around an artificial lake on a 500-acre tract of land, and will include the most modern equipment for work in chemistry, physics, metallurgy and mechanics

Science News Letter, June 22, 1946

SURGERY

The Lame Walk After Nerve-Cutting Operation

➤ A FORMER MAIL carrier who could not walk more than 300 feet can now walk unlimited distances and is back at work carrying mail

An amusement park operator whose job required a great deal of walking but who could not walk a block without pain can now walk continuously for three hours without pain

A veteran who had already lost his left leg was saved from having his other leg cut off above the knee

A laborer can now walk four blocks instead of two and is able to do indoor work though for years he could not work at all

These and 21 other patients who owe their ability to walk, saving of a leg and freedom from pain to a nerve cutting operation are reported by Drs Geza de Takats, Edson Fairbrother Fowler and Paul Jordan, and Capt Thomas C. Risley, of the University of Illinois College of Medicine and the Veterans Facility at Hines, Ill (*Journal, American Medical Association*, June 8)

The patients were unable to walk, threatened by gangrene and amputation, and suffered unbearable pain in some cases because of hardening and narrowing of arteries in their legs. The "excellent" results obtained by cutting nerves which influence constriction and dilation of the affected blood vessels are due to the release of normal tone of the blood vessel walls which in turn insures an even blood flow

Science News Letter, June 22, 1946

AERONAUTICS

Fan Type Propeller Reduces Aircraft Sound

➤ FAN TYPE propeller with a large number of blades and a low tip speed is the only method by which the sound level of an airplane can be reduced, Theodore Theodorsen and Arthur A Regier of the National Advisory Committee for Aeronautics told the National Light Aircraft meeting of the Institute of the Aeronautical Sciences in Detroit

They discussed the practical use of conclusions made as a result of experiments at Langley Field The so-called Gutin formula, with which aviation experts are familiar, permits the convenient calculation of the sound level of any aircraft propeller A simplification of the formula, achieved by graphs, gives the function for the sound level in the direction of maximum intensity

Airplane control from the viewpoint of the pilot's needs was discussed at the meeting by Wolfgang Langewiesche of Kollsman Instrument Division, Square D Company Controls, he said, are much more than merely a means of obtaining rotational motion about the three axes, they are in essence a means by which the pilot fixes definite flight conditions For example, he explained, a pilot knows that he is proceeding at high angle of attack largely by being aware that he is holding back pressure against the stick

He suggested that present airplanes are so difficult to handle, not because of the essential nature of airplane control, but because the essential nature of the controls is falsified by such effects as torque and change of trim with change of power

It is suggested further, he said, that airplanes would be easier to fly if manufacturers set themselves new standards of stability and control, calculated more closely to fit the pilot's needs

Science News Letter, June 22, 1946

ICHTHYOLOGY

Starfish Apparently Come In Seven-Year Cycles

➤ STARFISH, one of the worst enemies of oysters, apparently come and go in seven-year cycles, Martin D Burkenroad of the Bingham Oceanographic Laboratory, Yale University, reports in *Science* (June 7)

Mr Burkenroad's conclusion is based on a study of all available records of starfish numbers, going back to the middle of the last century. When they are most numerous, there may be more than half a ton of starfish to the acre, he says

The last peak period for these oyster-destroyers ended with the season of 1943 Mr Burkenroad expects the decline to continue until 1950, and the next maximum to come about 1957 Advantage may be taken of this knowledge, he believes, in planning oyster-planting and starfish-fighting activities

A starfish attacks an oyster by wrapping its arms around the shell until the oyster begins to suffocate and has to open up That's the end of the oyster

Science News Letter, June 22, 1946

EDUCATION

Nuclear Energy To Be Studied at Oak Ridge

➤ AN INSTITUTE of nuclear studies, a sort of superuniversity of the atomic age, is being organized in connection with the atomic energy operations that are concentrated in Oak Ridge.

Sponsored by a group of southeastern universities, this new educational institution would carry out research at the Ph D level and above in the fields of physics, chemistry, biology, medicine and engineering It would provide formal channels for cooperative research between government, universities and the industrial agencies involved in the atomic energy project at Oak Ridge.

Plans for the establishment of the Oak Ridge Institute of Nuclear Studies are announced in the scientific journal, *Science* (June 14). W G Pollard of the University of Tennessee and P W McDaniel of the Manhattan Engineer District are named chairman and secretary respectively of the organizing executive committee. TVA, Duke University, Carbide & Carbon Chemicals Corporation, Tennessee Eastman Corporation, Vanderbilt University and Monsanto Chemical Company are also represented on the Committee

Science News Letter, June 22, 1946

PHYSICS

Background of Atomic Bomb

It is well for the world to have the simple facts about the atomic bomb and something of its history in order to understand the Bikini demonstration.

By WATSON DAVIS

➤ WHILE THE attention of the world is focused on Bikini atoll in the Pacific awaiting the explosion of the fourth atomic bomb in history, here are the facts and background of the release of atomic energy and the bomb itself

The atomic bomb, such as used at Bikini, is the most concentrated blast of energy that man has ever set loose

It is not only the most powerful type of bomb in history, but its explosion is different from the conventional high explosives such as TNT. High explosives of the old sort have air, water and solid blast effects, but the atomic bomb has pressures of millions of atmospheres and adds to these radiation blast. It also produces clouds of radioactive substances more formidable than the most deadly poison gases.

Temperatures at the center of the atomic bomb explosion—which is all over in less than a millionth of a second—are so high, some 10,000,000,000 degrees Fahrenheit, that it is as though a star had been brought to earth Nothing else in the world is quite so hot and so bright.

The energy of the atomic bomb comes from the actual conversion of matter into energy The amount of energy released can be computed accurately by the famous law of equivalence of matter and energy that Dr Albert Einstein, of relativity fame, developed in 1905 This formula is E equals m times c squared, where c is the velocity of light, and E stands for energy and m is mass

Weight Military Secret

The actual weight of the active stuff in the atomic bomb is still a military secret It is maybe about 60 pounds, which could be carried in a suitcase If it were possible to convert 60 pounds of any kind of matter completely into energy, it would provide more energy than was generated by the whole electric power industry in the United States during the approximately four years of the war period, something like 680 billion kilowatt hours of energy.

Actually only a very small fraction of this total mass is changed into energy in the fission of the split atoms in the atomic bomb elements, whether it be uranium 235 or plutonium The energy produced is still ample and terrifying If all the atoms undergo fission in a 60-pound bomb, the energy released would be equal to that of the explosion of 550,000 tons of TNT. Yet if all the material in the active elements in the bomb could be gathered up and weighed after the explosion, you would still have almost 60 pounds

Although immense energy is released from the atomic bomb, it is not as large as that involved in some of the natural occurrences on the face of the earth, such as great earthquakes The earthquake in April off the coast of Alaska on the floor of the ocean that sent a tidal wave of destructive proportions to Hawaii undoubtedly involved much more energy. Destructive tidal waves from the underwater atomic bomb tests are not expected

Power Localized

The great power of the atomic bomb explosion is relatively localized The zone of total destruction is a circle of about two miles in diameter People and structures a dozen miles away are relatively safe except for some possible effects and radioactive substances that might be blown upon them by winds in the wrong direction.

The Bikini tests are designed to make careful observations of many effects not accurately known, but because of the military nature of the tests much of the important and significant data will not be announced to the public

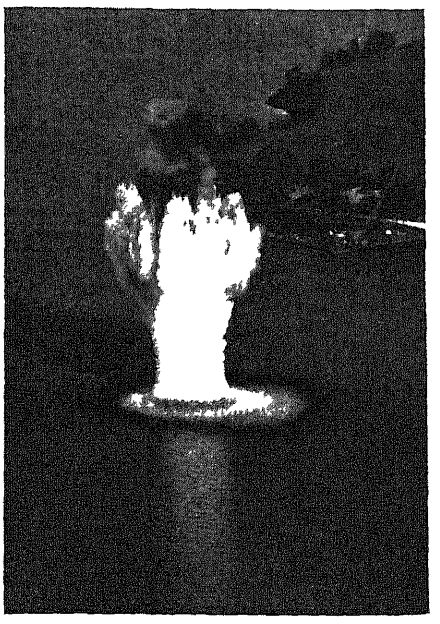
Sealed Cans To Be Used

One of the most useful of the test instruments used in the Bikini tests is a sealed can such as is used to transport gasoline The amount of collapse in this simple device gives an accurate measure of air pressure or air blast caused by the atomic bomb explosion

The extraordinary radiation produced by the atomic bomb explosion is perhaps more remarkable than the great destruction caused The heat produced is so intense that steel is vaporized and vanishes into the air

In addition to burns, the victims of an atomic bomb suffer true radiation sickness similar to to that seen in patients who get sick following massive doses of X-rays and radium Some severely radiated die in a short time In others a fever is caused, the victim feels sick and has loss of appetite, gums bleed, teeth are loosened so that they could be removed with the fingers, gold fillings become radioactive and at least temporary baldness is suffered

There was fear at first that the whole area exposed to the bomb would be made dangerously radioactive, but this does not seem to be the case In the Japanese and New Mexico explosions, practically all the radioactive products of the explosions were carried upward in the ascending columns of hot air and dis-



Joint Army-Navy Task Force One Photograph

BIKINI REHEARSAL—But this is not an atomic bomb. It is a TNT underwater explosion performed as a preliminary test at the Naval Mine Warfare Test Station, Patuxent River, Md., to provide data for underwater atomic explosions at Bikini Atoll.

persed harmlessly over a wide area

Extensive investigation will be made at Bikini of both radiation effects and radioactivity

The details of the manufacture of the atomic bomb are secret, but the Smyth report gives a general idea of how it is put together The bomb must be larger than a certain "critical size" in order to blow up The number of neutrons produced by the first fissions of the atoms must be sufficient to get into other atoms and produce further fission It must do this before the bomb flies apart The time that elapses between the beginning and the end of this nuclear chain reaction is extraordinarily brief This very, very short time—less than a millionth of a second—is the reason for most of the technical difficulties of making an atomic bomb

Neutrons Reflected Back

The bomb is evidently surrounded by an envelope of pure graphite or a similar substance that reflects many neutrons back into the bomb instead of letting them escape outward where they would not hit the hearts of atoms in the bomb This layer is called a tamper In addition to being a neutron reflector, it also helps to delay the expansion of the reacting material

Because there are enough neutrons from cosmic rays or sources inside the bomb to set up a chain reaction, it is necessary to keep the bomb in separate pieces, each below the critical size, until it is desired to produce the detonation When the bomb is to be set off, these separate pieces must be brought together just as fast as possible Evidently the method of assembling the bomb at the instant when an explosion is desired is to shoot one part as a projectile in a gun against a second part as a target Doing this successfully is not as simple as it sounds, of course, and much of the "know-how" of the atomic bomb itself is concerned with this problem

History of Atomic Bomb

When atomic bombs are exploded at Bikini, more historic dates will be added to the chronology of science's achievement of atomic power

The story of the release of atomic energy really begins with many discoveries, experiments and theories in nuclear physics in the 1930's, but the immediate start of the researches which resulted so spectacularly was in January, 1939, when two Germans, O Hahn (awarded the Nobel prize in 1945) and F. Strassmann proved that an isotope of barium was produced by neutron bombardment of uranium The neutron is a fundamental particle of matter without electrical charge and with a mass about equal to that of the proton or nucleus of the hydrogen atom

Two refugees from Germany, O R Frisch and Lise Meitner, suggested that the absorption of a neutron by a uranium nucleus sometimes caused that nucleus to split into approximately equal parts with the conversion of some of the mass, by Einstein's 1905 formulation, into enormous quantities of energy, a process called fission

These reports were brought to the January 26, 1939, conference on theoretical physics at Washington, D C., jointly sponsored by The George Washington University and the Carnegie Institution of Washington, with Niels Bohr of Denmark, Enrico Fermi and others discussing the problem. Experimental confirmation of uranium fission in several laboratories followed and the suggested likelihood of emission of neutrons in the process was demonstrated. This indicated the possibility of a chain reaction releasing energy explosively

On December 2, 1942, the first self-maintaining nuclear chain reaction was initiated at an uranium-graphite pile at Stagg Field Stadium, Chicago. On July 16, 1945, 5:30 a m, the first atomic explosion created by man blasted the New Mexico desert. On August 6, 1945, the first atomic bomb used in warfare was dropped on Hiroshima, Japan

Science News Letter, June 22, 1946

GENERAL SCIENCE

Seeds and Insects To Be Tested in Atomic Blast

➤ IN ADDITION to testing warships, the atomic bomb blast at Bikini will be turned upon seeds, molds, insects, and diseases of plants and animals

A collection of these test materials, carefully nursed by U S Department of Agriculture scientists, are now en route

Plants with new hereditary strains may result from the atomic bomb explosions X-rays are known to change the hereditary mechanisms of seeds and resulting plants, and scientists expect some such hereditary changes from the alpha and gamma radiation from the bomb.

Among the materials to be exposed at 25 locations in the bombed area are cereals, forage crop seeds, vegetable seeds, flower seeds, cotton seed, smut spores, snap beans, micro-organisms, various cultures for treatment of animal diseases, beetles, weevils, moths, mosquito eggs, termites, bedbugs, several kinds of ticks and mites

Science News Letter, June 22, 1946



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Do You Know?

Baby birds are said to have a nervous mechanism in their throats which slows down the speed of swallowing progressively as they become more filled with food, this indicates to the mother bird which nestling needs feeding

The *Altus project* in southwest Oklahoma is the first large scale irrigation undertaking in the state, construction, starting immediately, will put some 70,000 acres under irrigation when completed

The first radar equipped *control tower* for civilian flying, recently installed by the Civil Aeronautics Administration at Indianapolis, uses a console screen to give the controller a "plan picture" of all planes within 30 miles

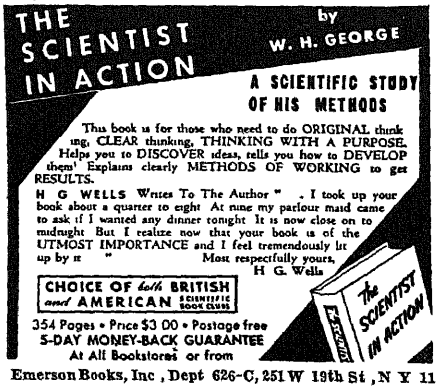
One advantage of using *dynamite sticks* to blast out a farm ditch is that the soil removed may be evenly scattered by the blasting over an area 200 feet wide on each side of the opening

Telegraph communication between Pittsburgh and the East was first established 100 years ago this year, railroad traffic from Pittsburgh to Philadelphia was opened four years later

The short *electro-magnetic waves* used in radar pulses are harmless to guinea pigs, laboratory tests show, and undoubtedly are harmless to man

Poultry manure has real value as a fertilizer for ornamental plants

Australia is testing *grain sorghums* from Kansas and Nebraska



ASTRONOMY

Amateurs Plan to See South American Eclipse

➤ TENTATIVE PLANS for an expedition to South America to see the total eclipse of the sun next May and suggestions on how to get a planetarium for your own town where you can study the planets and take that imaginary trip to the moon will be discussed in Bloomfield, Mich , week-end of the Fourth of July

For the first time since the war, amateur astronomers, many of whom made important military instruments during the war and were not able to study the stars, are going to have a national convention Some are sending photographs they have taken of stars and comets, others are shipping home-made telescopes for display at the Cranbrook Institute of Science, where the Fourth National Convention of Amateur Astronomers takes place, Friday through Sunday, July 5 to 7

Thousands throughout the United States who are enthusiastic about the heavens or telescope-making, whether members of an amateur group or lone star-lovers, are invited to this convention in the suburbs of Detroit. Amateurs not only from this country but from Canada as well are accepting the invitation of the Detroit amateur astronomers

Science News Letter, June 22, 1946

PHYSICS

Energy of Betatron Is Being Increased

➤ THE 100,000,000-volt betatron atom smasher in the General Electric Research Laboratory is having its output energy raised to 160,000,000 volts

Devised by W F Westendorp of the Laboratory's X-ray section, the method for increasing the voltage is called "DC bias" Briefly, this consists of applying a direct current to the eletromagnet as well as an alternating current This shifts the zero line from the middle of the current wave to its bottom and overcomes a difficulty caused by the fact that the magnetic field is in the wrong direction for guiding the electrons in their orbit while the voltage is passing from zero to its positive maximum, Mr Westendorp explains

Science News Letter, June 22, 1946

SURGERY

Spine Trouble May Cause Heart Disease Symptoms

➤ PAIN AROUND the heart, even when agonizing and of a constricting nature and radiating down the left arm, may be caused by trouble in the spine instead of the heart disease, angina pectoris, which it resembles, Col Allen Izard Josey and Lt Col Francis Murphey, of O'Reilly General Hospital at Springfield, Mo , report (*Journal of the American Medical Association,* June 15)

The spinal trouble which they found causing the pain in 30 cases was a ruptured disk between vertebrae at the bottom of the neck

The nerve pathway by which this condition produces pain around the heart is not known Operation and sometimes treatment by neck traction relieved the condition

The Army medical officers believe from their experience that ruptured disk should be suspected in all patients suspected of having either angina pectoris or coronary occlusion in whom the symptoms, physical signs and laboratory examinations are not conclusive

Science News Letter, June 22, 1946

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MEDICINE

Hayfever Cures Come, Go

Giving chemicals to weeds instead of patients might be best attack on the disease. Psychic factor needs consideration in judging value of new remedies.

➤ GIVING THE chemicals to the weeds rather than to people is probably the best way to get rid of hayfever While the half-dozen or so new drugs for hayfever reported in the past six months may relieve symptoms, the weeds whose pollen causes the misery in sensitive persons can be eradicated by chemical spray or fog

This is one of the peacetime benefits we can have from our biological warfare research which included potential chemical warfare on food crops as well as germ warfare on humans and domestic animals.

The new weed-killer 2,4-D, which was studied in these researches, can be a peaceful weapon to free millions of hayfever sufferers now and in the future All that is necessary is to lay down a fog of this chemical on roadsides, empty lots and other areas infested with ragweed, the chief cause of hayfever. The fogging when done at a very early stage of flower development will kill the plants before they shed any pollen, Drs Frederick G Smith, Charles M Hamner and Robert F Carlson found in tests at the New York State Agricultural Experiment Station at Geneva, N Y

So far as chemicals to attack the disease in patients are concerned, medical authorities are likely to be skeptical about even the newest for which great claims are made, a substance called "Anthallan" Hayfever remedies come and go almost every year Doctors undoubtedly will want to see results from carefully controlled studies before prescribing Anthallan to their patients

The hayfever drug arousing most enthusiasm in the medical world at present is benadryl Even this chemical has its limitations It is not considered a cure, but a medicine that relieves symptoms in hayfever and hives It is less effective in asthma

Psychic factors play a very important part in hayfever, asthma, hives, and other allergic disorders. The repeated visits to the doctor or clinic and ensuing attention when a new drug is being tried for hayfever may play a large part in the beneficial results obtained at first In carefully controlled studies, this factor is ruled out by substituting placebos, pills or capsules that look just like the drug under trial, for the drug itself for a time If the patient continues to be helped, the improvement obviously is not due to the new drug Whether such studies have been made with Anthallan is not known to authorities

Since the psychic factor is important in allergic disorders, many patients may be helped by treatment for the underlying emotional or personality disturbance without the use of medicine or of desensitizing injections

Science News Letter, June 22, 1946

ARCHAEOLOGY

Peruvian City Was Largest Ancient Center

➤ NEITHER the glory that was Greece nor the grandeur that was Rome produced the largest city in any ancient civilization, archaeologists of the Smithsonian Institution have decided

The honor, they say, of being the largest ancient city probably should go to Chanchan, a Peruvian center centuries before the Inca Empire that the Spaniards overthrew

Eleven square miles of ruins of this ancient city are located near the Viru Valley in Northern Peru where the most intensive archaeological studies yet conducted in South America are underway

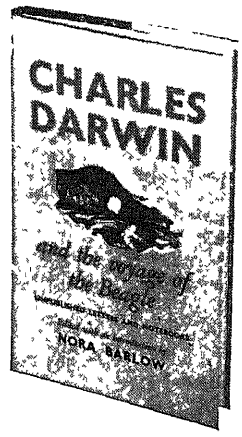
Center of the new research is the valley that was a site of flourishing culture long before the more famous Incas that the first European discoverers encountered The Viru Valley is now about 20 miles long and three to four miles wide, and is believed to have had a larger habitable area at the time when it was a center of the ancient civilization

How the valley grew smaller is one of the problems that is to be studied The habitable portion of the valley has been subject to alkalization of the soil by alkali-loaded irrigation waters from the Andes, and much may be learned about long-range planning for irrigation projects by tracing the history of this ancient development

The work in the Viru Valley is being conducted under the auspices of the Institute of Andean Research, with seven cooperating institutions. They are the Bureau of American Ethnology and the Institute of Social Anthropology of the Smithsonian Institution, Columbia University, Yale University, the American Museum of Natural History, the Chicago Natural History Museum and the Institute de Estudios Etnologicos of Peru

Science News Letter, June 22, 1946

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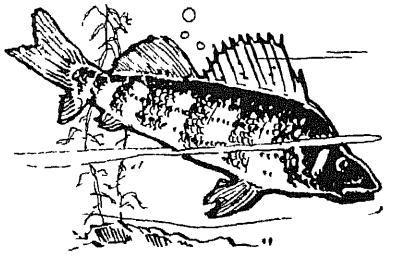
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PHYSIOLOGY

NATURE RAMBLINGS

by Frank Thone



Fish Can Drown

➤ RESPIRATION in fish is basically the same as it is in land animals, a matter of getting oxygen into contact with the blood corpuscles which will in turn get into contact with the body tissues that need it If that does not take place, the animal dies, be it fish or be he man, Drowning is really a form of suffocation

There are several ways in which fish can die for lack of oxygen One is sheer mechanical interference with their normal mode of respiration, the ceaseless business of gulping water in through the mouth and expelling it through the gill-slits If a fish has a stick thrust through mouth and gills and is then dragged at abnormal speed through the water (as small boys often do), it will die, and it will die of drowning, that is, suffocation, because it could not "breathe" naturally

A more wholesale extermination of fish through de-oxygenation of water takes place sometimes in summer, when fish that have been landlocked in a pond or lagoon find the water getting too warm, and at the same time swarming with fast-multiplying small forms of animal and plant life Fish ordinarily do not live in a green stagnant pool because green water is poisonous It is because the myriads of lesser organisms living there snatch up every available molecule of oxygen for themselves, so that there is none left to pass through the gill walls and enrich the fishes' blood

This kind of minor tragedy of the waters is relatively small-scale and unimportant, as compared with what the fish are often up against in rivers and lakes polluted by the outpourings of factories Sometimes these polluents are chemicals that directly poison the fish, much more often, however, they are things that the swarming bacterial life of inland waters can use for food They do feed greedily, using up oxygen in the process, until again the turbid water will not support fish respiration

In considerable areas in the tropics, small lakes and sluggish rivers go nearly dry in the hot season, and have so little oxygen in their water at all times that ordinary fish cannot live in them Their principal inhabitants are lung-fishes, strange creatures that have given up the use of gills entirely and depend on air sucked into their swimbladders which function as primitive lungs When things get really bad, these fish sink to the bottom, ball themselves up into mud cocoons, and sleep the summer through as toads and turtles sleep through our winter

Science News Letter, June 22, 1946

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CHEMISTRY

Hens Need Lots of Lime To Package Eggs Properly

➤ HENS, like farmers, have trouble in packaging eggs Farmers struggling with the problem of getting enough wooden or fiber cases in which to ship eggs should also consider the need of their laying hens for lime to form strong eggshells, the Utah Extension Service suggests Approved poultry diets allow more than twice as much calcium for a laying mash as for a growing mash.

Science News Letter, June 22, 1946

CHEMISTRY

Valuable Chlorine from Sulfur and Common Salt

➤ CHLORINE, that poisonous green gas that is as necessary to many industries as gastric juice is to human physiology, can be made copiously and cheaply by a new process on which U S patent 2,401,644 has just been granted to a du Pont research chemist, Dr Ralph K Iler of East Cleveland, Ohio.

Raw materials are sulfur and common salt, which chemically is sodium chloride The sulfur is burned, producing sulfur dioxide To this more oxygen is added, forming sulfur trioxide The trioxide is brought into contact with fine-grained salt, at a temperature between 450 and 600 degrees Centigrade Part of the sulfur is seized upon by the sodium in the salt, forming sodium sulfate, which is removed

From this reaction comes a mixed gas containing chlorine and sulfur dioxide in equal quantities This gas is then passed through dry silica gel, which adsorbs most of the sulfur dioxide The rest is taken out by contacting the gas with activated carbon or other catalyst, which combines it with part of the chlorine to form sulfuryl chloride, and holds it in liquid form on the carbon

The chlorine, now in substantially pure state, is drawn off and prepared for industrial use The sulfuryl chloride, subsequently recovered, is broken down again to sulfur dioxide and chlorine by heating, and these gases are fed back into the process

Science News Letter, June 22, 1946

A new family of *plastics* developed in Germany is based on isocyanates; no comparable product has been announced in the United States

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• Books of the Week •

THE ABC'S OF MODERN JAPAN—Wilson Morris—*American Council of Pacific Relations,* 64 p, illus, paper, 25 cents A compendium of facts about Japan divided into three general sections, describing Japanese education, home life, and various social institutions, the story of the Japanese empire and its relations to the rest of the world, and an indication of Japan's trade relations and internal social and political trends

BASKETFUL The Story of Our Foods—Irmengarde Eberle—*Crowell,* 256 p, illus, $2 Where our many fruits and vegetables first grew on our earth and how man learned to develop them to the fine flavor, size and food value that they have today

CURRICULUM ADJUSTMENTS FOR GIFTED CHILDREN—Elise H Martens—Government Printing Office, 82 p, illus, paper, 20 cents Practices and basic principles found in the organization of school programs to meet the needs of gifted and talented children, including reports of actual classroom experience.

ESQUISSE DE MES VOYAGES AU BRESIL ET PARAGUAY Considérés Principalement sous le Rapport de la Botanique—Auguste de Saint-Hilaire—*Chronica Botanica,* 61 p, illus, paper, $2 Extensive travel account reprinted from Saint-Hilaire's HISTOIRE DES PLANTES LES PLUS REMARQUABLES DU BRESIL ET DU PARAGUAY Though primarily of interest to botanists, it contains much of a general biological, geographical and historical interest Biographical sketch by Anna E Jenkins

FLORA OF GUATEMALA Part IV—Paul C Standley and Julian A Steyermark—*Chicago Natural History Museum,* 493 p, paper, $3 50 Fieldiana Botany, Vol 24, Part IV

GERANIUMS Pelargoniums for Windows and Gardens—Helen Van Pelt Wilson—*Barrows,* 248 p, illus, $2 75 A complete guide to geraniums, giving a new slant on an old fashioned plant

THE IMPROVEMENT OF TEACHER EDUCATION A Final Report by the Commission on Teacher Education—*American Council on Education,* 283 p, $2 A summary and interpretation of the experience gained from the five-year nationwide cooperative study of the Commission on Teacher Education The Commission's conclusions and recommendations are included

INDUSTRIAL ARTS ELECTRICITY—Clifford K Lush and Glenn E Engle—*Manual Arts Press,* 144 p, tables and illus, $2 A book written for use as a textbook in the junior high and high schools, but also of interest to the adult who wants to learn something of the mysteries of electricity

LABORATORY MANUAL OF ANATOMY AND PHYSIOLOGY—Nellie D Millard and Mary Jane C Showers—*Saunders,* 119 p, diagrs, paper, $1 Thirty lessons, each of which can be completed in a two-hour period, including the study of living animals, dissection of fresh and preserved specimens, microscopic examination of living and prepared tissues and investigation of physiological phenomena

LET'S SEE—E Laurence Palmer—*New York State College of Agriculture,* 32 p, illus, paper, 10 cents A leaflet explaining the nature of vision and giving some suggestions for the care of the eyes Cornell Rural School Leaflet, Vol 39, No 3

MAKE WORK EASIER—Helen Denniston and Margaret P McCordic—*Extension Service, University of Wisconsin,* 24 p, illus, paper, 5 cents Suggestions to the housewife for avoiding strain and saving energy by attention to posture and motions while at work

OUR AMERICAN LAND—The Story of Its Abuse and Its Conservation—Hugh H Bennett—*Government Printing Office,* illus, paper, 10 cents Facts and figures about soil and water in the U S, and their use and conservation

OUR ATOMIC WORLD—Robert E Marshak, Eldred C Nelson, Leonard I Schiff—*University of New Mexico Press,* 72 p, illus, paper, 50 cents A factual primer devoted to atomic energy and the atomic bomb, attempting to provide the average reader with understanding of those features of atomic energy which will be of importance to him in the years to come Written by three members of the Los Alamos Association of Scientists

PHYSICAL CONSTANTS OF HYDROCARBONS Vol III, Mononuclear Aromatic Hydrocarbons—Gustav Egloff—*Reinhold,* 661 p, tables and diagrs, $15 American Chemical Society Monograph, No 78

PROBLEMS IN PREJUDICE—Eugene Hartley—*King's Crown Press,* 124 p, tables, paper, $2 25 Studies based on the data obtained by the administration of tests to college students, includes tolerance of college students, analysis of tolerance, tolerance and personality traits, etc

ROCKETS—Robert H Goddard—*American Rocket Society,* 119, p, tables and illus, $3 50 Dr Goddard's two famous technical reports A METHOD OF REACHING EXTREME ALTITUDES and LIQUID-PROPELLANT ROCKET DEVELOPMENT There is also included an important foreword prepared by Dr Goddard shortly before his death, a biography of the physicist, and many photographs

THE SUBTLE SENSE—Ralph Bienfang—*Univ of Oklahoma Press,* 157 p, diagrs, $2 A treatment of the sense of smell from every angle, from its physiology to its practical aspects in business, from the use of perfumes to the identification of poison gases

VITAL PROBLEMS OF AIR COMMERCE—Lucien Zacharoff, ed—*Duell, Sloan, and Pearce,* 338 p, $3 A collection of speeches made by specialists presenting the pros and cons of the controversial issues which are posed by the air age

Science News Letter, June 22, 1946

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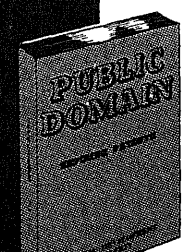
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Pat #1718219 covers a very well-known self-sharpening razor Expiration date—June 25th, 1946 At least one other company is already making, selling, advertising and profiting by the exact same item!

2

The general patent for a flexible (double-edge) blade expired in the 1930's Forty-three companies are now making these blades profitably with no licensing fees whatsoever!

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Science News Letter, June 22, 1946

⚙ *DETECTION device measures both oxygen and hydrogen impurities in gases with the same instrument Samples of the gases are dried and purified by activated charcoal and put in a calorimeter containing a precious-metal catalyst Oxygen and hydrogen present combine, creating measurable heat*

Science News Letter, June 22, 1946

⚙ *AIR SAMPLER, used to determine the quantity of disease-spreading airborne bacteria within buildings, is portable and electrically operated. As air is driven slowly through the device, static electricity attracts the positive and negative germ-laden air particles onto surfaces coated with a nutrient sticky jelly*

Science News Letter, June 22, 1946

⚙ *ADHESIVE TAPE has its sticky coating in spaced bands, making its removal easier It is perforated with spaced holes to permit ventilation, and has V-shaped notches on its edges so that it can be torn off in desired lengths.*

Science News Letter, June 22, 1946

⚙ *SHOWER and window curtains of plastic film are waterproof and mildew-proof, sheer enough to drape, and tough*



enough to withstand scrubbing with a brush Rows of any lace patterns, shown in the picture, are printed in white plastic ink on six different translucent pastel backgrounds

Science News Letter, June 22, 1946

⚙ *MOTION PICTURE machine that can be used in a well-lighted room sends invisible ultraviolet rays from the projector to the screen The screen is of a fluorescent material that absorbs ultraviolet radiation and emits visible light The usual bright cone of light between projector and screen is eliminated*

Science News Letter, June 22, 1946

⚙ *CONDENSER microphone, no larger than a quarter, is a non-directional program pick-up device for use in broadcasting Its small size, one inch long and one inch in diameter, helps eliminate distortion due to sound waves striking simultaneously against different portions of a microphone diaphragm*

Science News Letter, June 22, 1946

⚙ *LABORATORY pilot plant, a miniature production plant made of tantalum metal and Pyrex glass, can be used with most reagents except caustic alkalis and hydrofluoric acid Designed for heat transfer determinations, it can be used as a complete reaction unit*

Science News Letter, June 22, 1946

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Question Box

BIOCHEMISTRY

What is the latest advice on hayfever cures? p 397.

CHEMISTRY

Hens need what substance to package eggs properly? p 398

EDUCATION

What new institute is planned for Oak Ridge? p 393

GENERAL SCIENCE

Where will the new giant research center for automotive problems be built? p. 393

MEDICINE

By what method is tuberculosis prevented in nurses? p. 391

OPTICS

Living cells can be traced with what kind of new microscope? p 390.

PHYSICS

How does the atomic bomb compare with other explosives? p 394

What are radioactive "tracers"? p 387

PHYSIOLOGY

What would cause fish to drown? p 398

PUBLIC HEALTH

What is the new idea for preventing international spread of disease? p 389

SURGERY

How have the lame been helped to walk? p. 393

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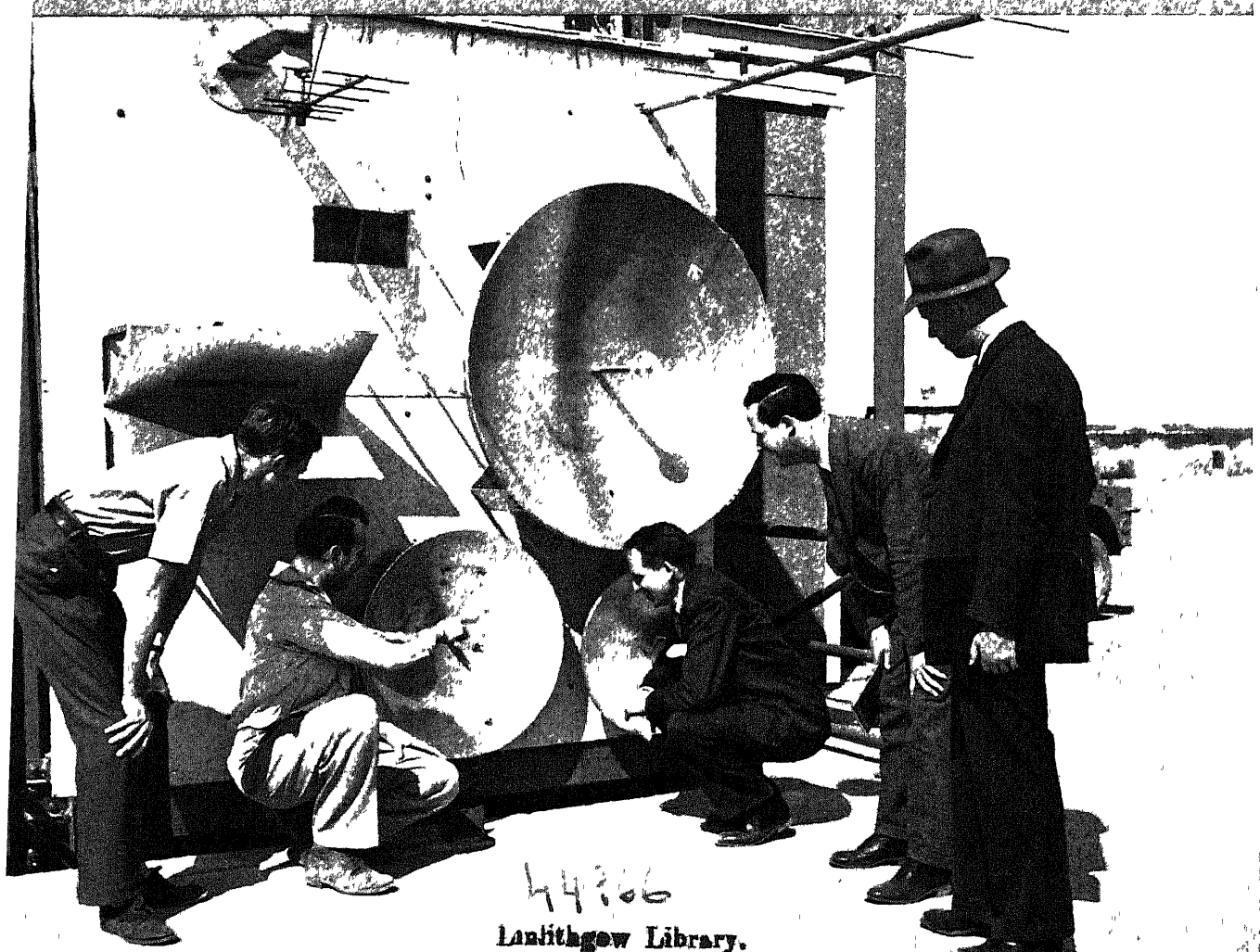
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INDEX

IENCE NEWS LETTER

Vol. 49, No. 26

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 29, 1946



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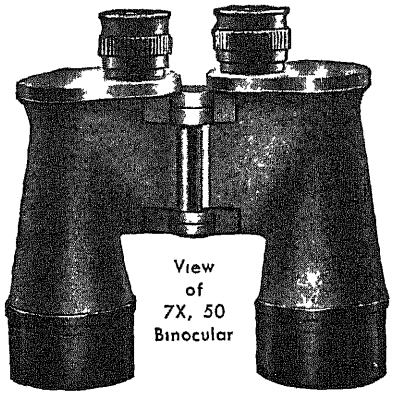
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CHEMISTRY

Cane Sugar Synthesized

A method for building up synthetic sucrose has been discovered for the first time, and used to make two new sugars never known before.

➤ FOR FINDING the key to the sugar molecule, which enabled them to build up synthetic cane sugar for the first time from simpler compounds, Drs W Z Hassid, M Doudoroff and H A Barker, research workers at the University of California, have been awarded the first intermediate $5,000 Sugar Research Foundation prize from the National Science Fund of the National Academy of Sciences

Coincidentally, it was learned that two sugars never found in nature have been invented by these scientists.

Cane sugar is a double molecule, built up of two simpler sugar molecules Many earlier attempts to link up the simpler sugars have failed because the role of phosphate compounds in building up the more complex molecule was not appreciated The California scientists succeeded, with the aid of an enzyme obtained from a culture of the bacterium *Pseudomonas saccharophila,* in combining glucose phosphate with fruit sugar to make the same sugar we get from sugar cane or sugar beets The phosphorus compound pulls the two simple sugars together, then steps out of the picture Until the experiments of Dr. Hassid and his colleagues, the part played by the phosphate group was not known to be essential

Two New Sugars

Having found the key to the problem, the research group has since used this new method to make two other sugars unknown in nature and never seen or tasted by man before

Three kinds of double sugars, in addition to cane sugar, are known in nature One of these is lactose, or milk sugar. Another is maltose, formed in sprouting grain, which feeds beer yeasts and contributes to the flavor of malted milk The third is cellobiose, formed by chemical treatment of wood. These three kinds of sugar are made up of pairs of similar molecules.

One of the new synthetic sugars made by the California scientists follows essentially the same pattern. Glucose phosphate was made to combine with sorbose to make glucosido-sorboside, an unknown product, instead of glucosido-fructoside, the material for which your grocer collects ration stamps

But sorbose, the unusual constituent of the new sugar, is not very different from glucose Similar arrangements of the same atoms make up its molecule The two differ only in whether certain groupings of atoms occur on the right side or the left side of the molecular structure Such differences make some alteration in how fast sugars dissolve and how sweet they taste, but chemically sorbose and glucose are two of the possible 16 sugars of the same pattern Linking these sugars results in double sugars of the maltose, lactose, cellobiose type

"Tagged Atom" Technique

The second new sugar formed by Dr Hassid and his co-workers is built more on the pattern of cane sugar The simple sugar which is joined to the glucose phosphate is ketoxylose The structure of ketoxylose is similar to that of the fructose half of the cane sugar molecule Both are ketoses, whose structure is fundamentally different from that of glucose, although both contain equal numbers of the same carbon, hydrogen and oxygen atoms

Now that the simple sugars, which can be put together chemically, have been synthesized to double sugars by the new process, the research group hopes to be able to use the new "tagged atom" technique, made available by atomic research, to learn what use is made by the body of the two halves of the sugar molecule.

Each half could be studied separately as it undergoes transformation to blood sugar, which plays such an important part in nutrition and body chemistry The newly appreciated importance of phosphorus compounds in sugar synthesis can also be followed by the introduction of compounds of the radioactive phosphorus isotope into the reactions discovered by Drs Hassid, Doudoroff and Barker.

The synthesis of sucrose or of the new sugars will find no use in increasing the food supply. These researches will not lessen the sugar shortage

New compounds of the many sugar-like substances already known, and perhaps others, to be formed by modifications of known processes, will bring to research workers many opportunities to learn how the growing plant builds up the carbohydrates upon which we in common with all animal life depend for food

Science News Letter, June 29, 1946

PHYSICS

Electron Microscope's Magnification Doubled

➤ THE USEFUL magnifying power of the electron microscope has been increased from 100,000 diameters to more than 200,000 diameters by an improved magnetic lens developed by Dr James Hillier, aided by Perry C Smith, at the RCA laboratories

This great step forward in the conquest of the sub-microscopic world was disclosed in a paper communicated to the American Institute of Physics (*Journal of Applied Physics,* April). Dr Hillier reported that he had succeeded in improving the magnetic lenses that focus the electron beams to such an extent that it is now possible to distinguish particles separated by as short a distance as 13 Angstrom units, or about 50 billionths of an inch This means roughly that 50,000 distinct particles could be recognized in a distance equal to the width of a hair Dr Hillier pointed out, however, that numerous technical problems still await solution before such high resolving power will be available to scientists generally

Just how much this new development will affect science is difficult to predict, but it is thought that structural details of large molecules and the action of drugs on bacteria will be among the things that will become visible. Actual visual pictures of molecular structure will open vast new fields in organic chemistry, the science that has already given us nylon, rayon and other plastics, as well as synthetic rubber and life-saving drugs In the field of medicine, it is certain that our new knowledge of the finer structure of viruses and living cells will aid us greatly in our fight against such still unconquered diseases as infantile paralysis and cancer.

Science News Letter, June 29, 1946

RADIO

2,000 Mile Short-Wave

See Front Cover

➤ TELEVISION, RADAR and ultra short-wave radio transmissions over 2,000 miles, and faster data for forecasting the weather, may all result from studies being conducted by the Navy at an abandoned Army air base at Gila Bend, Ariz

Under the sponsorship of the Navy's Bureau of Ships, scientists from the Navy Electronics Laboratory, San Diego, Calif, are working on a $500,000 project for studying the effects of weather changes on high frequency radio transmission.

Dr John B Smyth, who heads the scientists on the project, predicts that the study of weather conditions may extend the range of ultra short-wave radio and radar transmissions, and ultimately television, as much as 2,000 miles Ultra short-wave radio transmissions are now limited to 150 miles

Scientists on the project will not admit that weather forecasting from radio transmissions is yet likely, but the project has already used this system to detect atmospheric changes ahead of the best meteorological instruments

Based on the suspicion of scientists that the wide variation in the range of high frequency radio waves is due to weather conditions such as the temperature, air pressure and humidity, the studies were started early in 1945 to determine what frequencies would send out transmissions best under different weather conditions

The extended range for high frequency waves is expected to result from data showing which frequencies should be used for various conditions of weather.

Three 200-foot towers have been constructed at the former $2,500,000 Army air base at intervals of 25 miles The Gila Bend tower has transmitters that can be raised and lowered to vary the height of transmissions sent at frequencies ranging from 170 to 24,000 megacycles. Other towers at Datelan and Sentinel contain receivers, while each tower has a complete set of weather instruments

Weather instruments set along the course keep records of the temperature and humidity at the time of transmissions and stationary kytoons (kite balloons) chart the weather above the towers.

Similar experiments have been conducted over water using towers at Point Loma and San Pedro, Calif

The Gila Bend project has brought visiting scientists from Great Britain, Canada and Australia, and the University of California and the University of Texas are using the project's facilities for related research projects

The picture on the front cover of this SCIENCE NEWS LETTER shows Dr John B Smyth and assistant explaining features of the radio transmitters to visiting British scientists at the Gila Bend tower

Science News Letter, June 29, 1946



Official U. S Navy photograph

200 FEET UP—A close-up of the steel tower at Gila Bend showing the elevator with transmitter being hoisted to the top.

BIOCHEMISTRY

Corn Cob Mixture Blasts Carbon Off Engine Parts

➤ CARBON that forms in the engine of your car can now be blasted off with a mixture of ground corn cobs and rice hulls in an ordinary sand-blasting machine instead of the tedious scraping job used in most garages

At the first showing of the new process, carbon-covered cylinders and other automobile engine parts were quickly brought to a shine with the soft grit blasting Developed by the Bureau of Agricultural and Industrial Chemistry at the Department of Agriculture Laboratory at Peoria, Ill, the blasting mixture uses 60% ground corn cobs and 40% ground rice hulls

Discovered during the war, the soft grit blasting was first used on airplane engines by the Navy, and a plant at Bloomington, Ill, produced the new blasting material for Naval use.

Sand-blasting machines are used for the process, but ordinary sand blasting would damage the part being cleaned The corn cob and rice hull mixture removes the carbon and grease without damage to the surface of engine parts.

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BIOCHEMISTRY

Bones Make Red of Blood

Hemoglobin is manufactured by bone marrow much faster than has hitherto been supposed, as proved by tracer work with radioactive iron.

➤ TRACER experiments with radioactive iron show that the bone marrow manufactures the red blood pigment, hemoglobin, much more rapidly than had been supposed and that the liver acts as a storehouse for iron

These new findings have been reported by two University of California researchers, Dr D Harold Copp, instructor in physiology, and Dr David M Greenberg, professor of biochemistry, who used a superior radioactive isotope of iron for the first time in tracer work

They found that within three hours some of the radioactive iron appeared in the red blood cells, an amazingly rapid absorption, and that within 24 hours one-third to one-half of all the absorbed radioactive iron has been transferred to these cells.

When there is no deficiency, iron is stored in the liver, and is transferred to the bone marrow for use in the production of hemoglobin when iron is removed from the diet Thus the stored iron postpones the appearance of deficiency symptoms such as anemia

Drs Copp and Greenberg found that there is no liver storage when hemoglobin manufacture is stimulated by iron deficiency, by the action of small amounts of copper or cobalt, or following severe blood loss The metal, in these cases, is being used rapidly by the bone marrow

While the experiments were performed with rats the findings are significant for man as well, since the metabolism of this animal is much like that of the human species

The experiments were performed with iron 55, a radium-like member of the iron family produced by bombardment of manganese in the cyclotron This isotope of iron was identified and separated at the University of California, the work being done by Prof Glenn T. Seaborg, co-discoverer of plutonium, and by Dr Martin Kamen, now at Washington University, St. Louis.

Iron 55 can be produced in a very pure form though in minute quantities too small for human research Because of its purity it is superior for biological research to iron 59, the isotope previously used for "tracer" work Iron 59 is diluted by a large percentage of non-radioactive iron which makes it necessary to give doses up to 1000 times those used in work with iron 55.

In their experiments the researchers fed anemic and normal rats 15 microgram doses—hardly more than enough to cover a pin point—of iron 55 The animals were then sacrificed at intervals, and the radioactivity in the various organs was counted by a Geiger counter

The iron from the sacrificed animals was electroplated to make counting easier, and a special Geiger counter, of extreme sensitivity, was devised to catch the very weak radiations of iron 55

Science News Letter, June 29, 1946

ENGINEERING

Belt Conveyors Reduce Accident Hazards

➤ BELT CONVEYORS in coal mines, to carry the coal from working faces to outlets, reduce accidents, the American Mining Congress was told

Ray Cobb of the West Kentucky Coal Company described the operation of these endless belts, made of a wide strong fabric running on rollers, which are used instead of underground railways Over 130 miles of them are in operation in American coal mines, first installation being made less than two decades ago

One of the advantages is that the belt conveyor delivers a constant flow of coal from all sections of the mine to the coal tipple The whole conveying system is started simultaneously by pushing a button The haulage system needs only a minimum of supervision

Railway equipment is still the most widely used method of underground coal transportation, C R. Nailler and C C Hagenbuch of the Hanna Coal Company emphasized at the same meeting Improvements have been made in the past decade in track-mounted equipment Such equipment, they said, properly installed and maintained, will provide adequate, profit-producing haulage between coal face and tipple.

Science News Letter, June 29, 1946

MATHEMATICS

Desk Electric Computer Aids Chemical Research

➤ A NEW DESK-SIZED electric computing machine, designed to speed mathematical equation solutions in physical and chemical research, will cut tedious hours of work to minutes It has been reported to the American Institute of Physics by Clifford E Berry, Doyle E Wilcox, Sibyl M Rock and H W. Washburn of the Consolidated Engineering Corporation

The new calculator, designed during the war, will speed research and development in such diverse fields as the analysis of complex organic petroleum products, aircraft design, and electric circuit analysis

The computer handles especially what is known to the mathematician as linear simultaneous algebraic equations In spite of the impressive name, these are nothing but a more lengthy cousin of the elementary high-school variety of algebraic equations

As many as twelve of these can be given to the computer to solve. This task, which might take an expert calculator five hours of tedious work to complete using conventional types of machines, can be done with much higher accuracy in a matter of forty minutes

One reason for this speed is that each number needs to be handled only once, and no intermediate results have to be written down, effectively eliminating one of the most common sources of error

To operate the computer, the given quantities of each equation are set up on knobs located on a revolving drum Another one of a row of graduated dials, located on the front panel, is then adjusted to give a null indication on a small indicating tube in the center of the front panel This process is repeated for each equation on a different set of knobs moved into view by means of a handwheel that turns the drum. The solutions are shown on the dials used to obtain the null-indications.

The computer is of the analog type that uses physical quantities to represent the numbers involved. In this new device, these quantities are the ratios of accurately known resistances, a feature that contributes to the high inherent accuracy of the computer

Science News Letter, June 29, 1946

The 1945 *birth rate* in America was almost twice the death rate.

PHYSICS

Many New Radioisotopes

➤ THE ATOMIC bomb project has developed a "considerable number" of still-secret radioactive isotopes and superior methods of their production which will result in epoch-making advances in nuclear science, Dr Glenn T Seaborg, professor of physics at the University of California and co-discoverer of plutonium, stated.

Addressing a petroleum conference of the American Association for the Advancement of Science, Dr Seaborg pointed out that more than 400 artificial radioactive isotopes, or "sisters," of ordinary elements have been made public These elements are useful for tracer or "atom tagging" experiments in chemistry, physics, biochemistry and medicine.

"The work in connection with the plutonium project of the atomic bomb development has resulted in the production, or possibility of production, of a considerable number of additional radioactive isotopes, many of which are still in the secret category," Dr Seaborg stated

"More important than this, however, is the fact that this development has given rise to vastly superior methods for the production of a number of these isotopes and in particular a number of the most important ones It seems realistic and entirely safe to predict that a large number of advances and discoveries will be made in the future, a few of them epoch-making"

Dr Seaborg said that the "pile" technique of production and the 184-inch cyclotron now being built on the University of California campus will be instrumental in these advances and discoveries

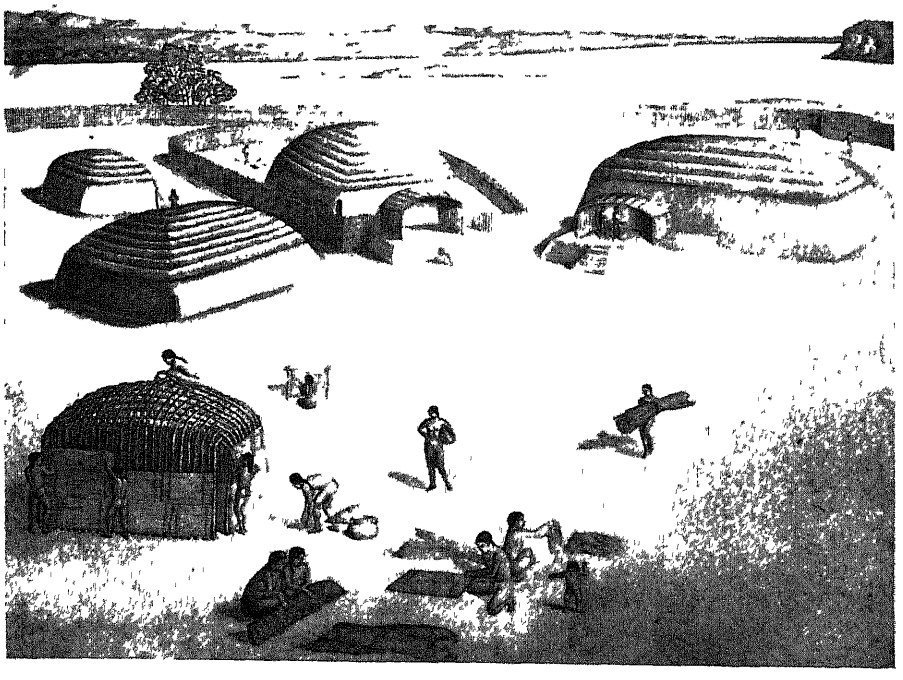
"The fission product elements, that is, the radioactive isotopes in the region of atomic numbers about 35 to 60 inclusive, are available in tremendous amounts," Dr Seaborg said

"The pile, as a powful neutron factor, also makes it possible to produce important amounts of practically any radioactive isotope which can be produced by neutrons and since almost all the important isotopes can be produced by neutron irradiation, this means that in the future practically all important isotopes should be available in huge intensities

"In the near future there will also be available another device which will introduce another order of magnitude into the attainable energy of charged heavy particles, hence will undoubtedly give rise to another milestone in the field of transmutation

"Within a few months the new 184-inch giant cyclotron at the University of California will be ready for operation Using the new frequency modulation principle in order to compensate for the relativistic increase in mass at these tremendous energies, this instrument will generate deuterons at 200,000,000 electron volts and helium ions at 400,000,000 electron volts This will result in many entirely new nuclear reactions"

Science News Letter, June 29, 1946



***ANCIENT VILLAGE**—This painting by Prof. M. Kneberg shows the three great council houses at one end of the public square, and in the foreground is a home under construction in the village on Hiwassee Island. The town was fortified with a stockade because the people who built it had evicted the earlier inhabitants.*

ARCHAEOLOGY

Early Indians Had Modern Troubles

➤ THEY HAD no atomic bombs, but other modern dangers including aggressor nations, famine and toothaches wiped out four different Indian peoples who inhabited an island on the Tennessee River in the course of 700 years, University of Tennessee archaeologists report

Hiwassee Island, second largest island in the Tennessee River a few miles from Dayton, scene of the famous courtroom battle between Clarence Darrow and William Jennings Bryan, was the home of Indian tribes almost continuously from the twelfth or thirteenth century A D until 1818, excavations on the island reveal Profs T M N Lewis and Madeline Kneberg of the University of Tennessee, who conducted the work at Hiwassee, say that the first Indians on the island were wiped out by an aggressor nation after perhaps two centuries

At the time of the first European settlements in America, the island was the home of two more Indian tribes, who died from diseases brought over from Europe by the white men, according to the archaeologists

This early and unintentional "germ warfare" also accounted for the fourth Indian inhabitants of Hiwassee, the Cherokees, who abandoned the island in 1818

The investigators declare that dietary deficiencies were noted in most of the human remains of the inhabitants of the island with tooth trouble especially prominent They estimate that at least 45% of the islanders at the time of Columbus suffered from toothaches

Science News Letter, June 29, 1946

AAAS buys building ____ 315
AAUW study grants ____ 71
Abbot, Charles G ____ 310
ACS serum explained ____ 259
Adair, Frank E ____ 39
Adams, Roger ____ 152
Adding machine, pocket ____ 288
Adel, Arthur ____ 83
Adhesive tape ____ 400
Aebersold, Paul C ____ 388
Aerial counterspies ____ 43
Aerodynamics research ____ 53
Aeronautical laboratory ____ 41
Air-conditioner, planes ____ 268
Air purification ____ 9
Air sampler ____ 100
Aircraft secrets, wartime 201
Airplane traffic ____ 13
Airport traffic control ____ 377
Alatorre, Alfonso V ____ 312
Alexander, L G ____ 246
Alexander, Robert ____ 296
Aleut language ____ 72
All-weather flying ____ 99, 348
All-weather tests ____ 158
Alkalies for poisoning ____ 35
Alkyl sulfates ____ 40
Allen, O N ____ 340
Allison, Samuel K ____ 274
Alloy, new ____ 238
Almy, Gerald M ____ 242
Althausen, T L ____ 345
Altschul, A M ____ 54
A M A Health Plan ____ 6
America in lead ____ 7
Amino acids, modified ____ 251
Ammonia, anhydrous ____ 168
Ammonia for tooth decay ____ 117
Amphibious vehicle ____ 233
Amputees, civilian ____ 286
Ancient cities ____ 377
Ancient people, study ____ 168
Anderson, E L ____ 197
Anderson, Rudolph ____ 274
Andrews, C H ____ 42
Anemia, thymine for ____ 233
Anesthetic for insects ____ 56
Anesthetic, new ____ 218
Anigstein, Ludwik ____ 260
Animals from London Zoo 69
Animals, germ-free ____ 229
Antenna, FM ____ 416
Anthallan ____ 397
Antibiotic from ginger ____ 278
Antibiotics development ____ 167
Antibiotics, new ____ 6, 339
Antimalaria drug ____ 30, 57, 307
Anti-foam agent ____ 240
Anti-vibration unit ____ 80
Appendicitis fatalities ____ 200
Aralen ____ 307
Arc lamp ____ 272
Archipelago, drowned ____ 358
Arctic research, Soviet ____ 313
Army "goes scientific" ____ 244
"Army of Health" ____ 117
Arnold, H H ____ 72
Arnold, Stephen ____ 163
Asenjo, Conrado F ____ 152
Ashby, M C ____ 365
Aslakson, Carl I ____ 414
Assembly-line homes ____ 186
Astronomer decorated ____ 94
Astronomical station ____ 206
Astronomy meetings ____ 85
Atcorob ____ 24
Atom control psychology 359
Atom smasher, new-type 291
Atom splitting, birth of 167
Atomic bomb background 394
Atomic bomb chemistry ____ 391
Atomic bomb effects ____ 78, 179
Atomic bomb protection ____ 185
Atomic bomb test ____ 346
Atomic by-products ____ 23 29
Atomic cloud ____ 309
Atomic Guggenheim winners ____ 287
Atomic energy control ____ 214
Atomic energy, peacetime 140 197
Atomic heat problem ____ 228
Atomic jobs, future ____ 227
Atomic misinterpretation 187
Atomic plant, peacetime ____ 265
Atomic power ____ 41
Atomic power, subs ____ 392
Atomic power, liners ____ 248
Atomic powered navy ____ 275
Atomic test, gas cans for 309
Atoms, exploding ____ 282
Atoms make new laws ____ 247
Atoms, peacetime ____ 277
Atwood, Wallace W ____ 24, 312
Automotive research ____ 393
Aviation problems ____ 185
Axelrod, Helen E ____ 265
Ayre, J Ernest ____ 249

B needed to utilize protein ____ 265
B-29 record ____ 72
B-29 surpassed ____ 184
B-50 superfortress ____ 184
Babcock, Ernest B ____ 274
Baby carriage ____ 336
Baby food ____ 373
Baby, two-headed ____ 40
Bacterial warfare ____ 18, 19, 22
Bahama banks, oil in ____ 244
Baikov, Alexander ____ 101
Bailey, John Hays ____ 278
Bainbridge, K T ____ 274, 388
Baird, Douglas ____ 163
Baker, David B ____ 313
Baker, James A ____ 174
Baker, W O ____ 243
BAL ____ 342
BAL and poison ____ 200
Baldwin, Ira L ____ 18
Baldes, E J ____ 183
Bane, T H Prize ____ 63
Bank, savings ____ 48
Barach, Alvan L ____ 325
Barbecue, portable ____ 48
Barbecuing attachment ____ 128
Barker, H A ____ 403
Barker, H A ____ 20
Barker, Joseph W ____ 360
Barnard, Chester I ____ 214
Barnes, G M ____ 7
Barnes, R Bowling ____ 86
Bartholomew, Harland ____ 349
Baruch, Bernard M. ____ 200
Baskerville, W H ____ 219
Bateman, Alan M ____ 46
Battery, tiny dry ____ 192
Bauld, W A G ____ 249
B C G Vaccination 391, 283
Beadle, G W ____ 264
Beams, J W ____ 328
Beard, R L ____ 239
Beck, Oleta ____ 340
Bed, stowaway ____ 416
Beese, N C ____ 56
Beetles, Japanese ____ 392
Beinhart, E G ____ 148
Bell, James E, Jr ____ 15
Belt Conveyors for mines ____ 405
Benadryl ____ 397
Bensin, Basil M ____ 374
Bentley, Lillian S ____ 216
Berger, E H ____ 35
Beriberi, in orient ____ 137
Bernstein, Eugene T ____ 157
Berry, Clifford E 7, 43, 405
Betatron, energy of ____ 396
Betatron, "baby" ____ 242
Bethe, Hans A ____ 331
Beverage container ____ 144
Biggers, Paul R ____ 115
Bikini background ____ 394
Bikini, effects on fish ____ 116
Bikini, photo story ____ 344
Bikini volunteers ____ 329
Bikini, television on ____ 153
Bindings, book ____ 134
Binoculars, night ____ 160
Biological warfare ____ 18, 19, 37 324
Birds, returning ____ 188
Birdseye, Clarence ____ 279
Birkhoff, George D ____ 84
Black, Davison ____ 25
Blackout Prevention ____ 183
Blakeslee, Howard W ____ 201
Blandy, W H P ____ 153, 329
Blind landing possible ____ 120
Blind, talking books for 25
Blood pressure surgery ____ 131
Boat seat unit ____ 240
Boaz, Ernest ____ 6
Bogomolets, Alexander A 259
Bohr, Niels ____ 287
Bok, Bart J ____ 204
Boland, Edward W ____ 147
Bolton, Elmer K ____ 271
Bomber, flying wing ____ 295
Bondi, Amedeo ____ 229
Bonnet, David D ____ 105
Boone, John A ____ 15
Borden, W A ____ 18
Bortin, Mortimer M ____ 156
Botanical classic ____ 73
Bottle carrier ____ 320
Botulism, weapon against 323
Bowen, Harold G ____ 7, 223 275, 392
Boyer, Raymond ____ 221
Bradbury, Norris E ____ 187
Bradley, Wilmot Hyde ____ 274
Bradlow, H L ____ 264
Brady, Frederick J ____ 262
Brain study aids ____ 102
Brain tumor ____ 373
Bread, new ____ 101, 119
Brice, Arthur ____ 390
Brines, O A ____ 35
Broadcasting equipment ____ 384
Brock, Vernon ____ 291
Brod, B M ____ 185
Brodie, James H ____ 73
Bronk, D W ____ 274
Brown, Ethan Allan ____ 194
Brown, Roland W ____ 216
Brunsting, Henry A ____ 232
Buckley, O E ____ 316
Bud scales ____ 156
Buddingh, G J ____ 42
Buell, Murray F ____ 46
Buffalo disease cause ____ 183
Buffalo grass ____ 41
Bulldozer rescues fossils ____ 57
Bulldozer tractor ____ 4
Burbank, Luther ____ 317
Burckhalter, J H ____ 263
Burdon, Kenneth L ____ 340
Burger, Albert ____ 308
Burkenroad, Martin D ____ 393
Burns, Thomas ____ 259
Burr, H S ____ 361
Burton, Charles J ____ 86
Bush, Vannevar ____ 197
Busignies, Henry ____ 108
Butterflies ____ 341
Byerly, Perry ____ 274
Bykov, Konstantin ____ 103

Cable for tractor ____ 4
Calculating device ____ 176
Calculator, Desk, electric ____ 205
Calorie-cutting effects ____ 293
Calutron ____ 8
Calvin, Melvin ____ 184
Camera filter ____ 320
Camera, shutterless ____ 377
Cameron D Ewen ____ 355
Cameron, William J ____ 345
Campbell, G A ____ 56
Cancer ____ 39
Cancer and hair color ____ 296
Cancer cause suggested ____ 246
Cancer, control of ____ 213
Cane Sugar Synthesized ____ 403
Canned food ____ 40
Cannon, Paul P ____ 274
Cannon, Walter B ____ 18, 274
Cape, Arthur T ____ 159
Capitol visit ____ 165
Capron, M J ____ 35
Carbon 13 ____ 25
Carbon 14 ____ 29, 415
Carbon black ____ 317
Carbon, cheaper ____ 278
Carbon dioxide, insects ____ 56
Cargo container ____ 261
Carlson, Anton J. ____ 210
Carlson, John R ____ 185
Carlson, Robert F ____ 285, 397
Carolina "bays" ____ 46
Carrier-based planes ____ 277
Carroll, R W ____ 247
Carrots and vitamin A ____ 216
Carson, Hampton L ____ 184
Catapaults, hydraulic ____ 169
Caterpillar, skipper ____ 328
Cattle ticks controlled ____ 115
Cattle, untamable ____ 142
Cavallito, C J ____ 278
Celestial sighting device ____ 160
Cellulose acetate ____ 328
Cell life, movies of ____ 100
Cereal grains, stored ____ 54
Chambers, T H ____ 327
Chameleons, dwarf ____ 105
Chapman, S. S ____ 339
Chapman, Sidney ____ 274
Charm bracelets, antique ____ 199
Chemical fights disease ____ 190
Chemical research aided ____ 405
Chesney, Alan ____ 277
Chew, W B ____ 35
Chidlaw, B W ____ 235
Chimney controls smoke ____ 412
Chintz, durable glazes on ____ 105
Chisholm, G B ____ 18
Chlorine from sulfur ____ 398
CHM polymer ____ 6
Chubb, L W ____ 8, 309
Church, Phil E ____ 412
Cigarette holder ____ 336
Citric acid ____ 349
Civilian nuclear control ____ 223
Clabaugh, W Stanley ____ 121
Clams caught with salt ____ 296
Clark, D E ____ 62
Clark, William H ____ 183, 313
Clay, Lucius D ____ 152
Claybourn, John G ____ 79
Clean-keeper, typewriter ____ 304
Cleaner, floor ____ 304
Clements, William A ____ 87
Clendenin, J D ____ 278
Clifford, Albert M ____ 190
Clingan, I C ____ 126
Cloud measuring device ____ 158
Clouds of gas ____ 245
Clock, electric ____ 384
Coal car, lightweight ____ 252
Coal, fossils in ____ 2
Coal furnace, smokeless ____ 238
Coates, C W ____ 57
Coaxial cable ____ 36
Coaxial speaker ____ 192
Cobb, Ray ____ 405
Code, C F ____ 183
Coe, J R ____ 388
Coffee float ____ 112
Coffee maker ____ 320
Cofman, Victor ____ 136, 149
Cohn, Alfred ____ 199
Cohn, Edwin J ____ 323
Cohn, W E ____ 388
Coin machines ____ 160
Colbert, William H ____ 251
Cold, cure for ____ 313
Collectors, GI ____ 72
Collins, H W ____ 14
Collyer, John L ____ 38
Colonna, Frances ____ 51
Comet, new ____ 105
Comet Pajdusakova-Rotbart ____ 372
Communication for subs ____ 104
Communications, radio ____ 14
Compact illuminated ____ 240
Compass, direct-reading ____ 208
Computer, electrical ____ 43
Computing machine ____ 118
Comroe, Julius H ____ 181
Concrete from coral ____ 86
Condenser microphone ____ 400
Condon, E U ____ 163
Conical rotating valve ____ 392
Conrad, V ____ 366
Cook, S F ____ 136
Cooke, H L ____ 24
Cooking, quick saves vitamins ____ 203
Coon, B F ____ 392
Cooper, Arnold M ____ 259
Cooper, H K ____ 174
Copp, D Harold ____ 405
Cord, coiled ____ 416
Coriell, Lewis L ____ 339
Corn Cob Mixture ____ 404
Corn damaged beetles ____ 392
Cornell University ____ 41
Corson, Dale R. ____ 211
Cosmic hiss ____ 68
Cosmic rays ____ 313
Cosmic ray bomb ____ 309
Cotton growing ____ 313
Cottonseed oil ____ 219
Cottrell, Frederick G ____ 360
Couch, James F. ____ 84, 246
Cowles, Raymond B ____ 375, 382
Crabs eat jellyfish ____ 105
Cracks frozen shut ____ 169
Craigie, J ____ 174
Crane, Carl J ____ 73
Crater Arizona's ____ 2
Crater Lake Volcano ____ 120
Creech, Hugh T ____ 340
Cron, Richard ____ 291
Crosley car ____ 63
Crosley, P, Jr ____ 51
Culture theory ____ 356
Cunningham, L E ____ 105 372
Curtis, L E ____ 132
Custer, William A ____ 169

Dandelion rubber ____ 72
Dannevig, Karen M ____ 71
Daro, Dimone ____ 71
Darton, N H ____ 2
Darwin, Charles ____ 358
Davis, Clyde O ____ 93
Davis, Watson ____ 10, 19, 20 201, 212, 215, 268 282, 307, 310, 324 371, 394
DDT ____ 5, 8, 35, 40, 308, 318
DDT, insects' nerves ____ 217
DDT and retonone ____ 115
DDT competitor ____ 71
DDT's future ____ 275
DDT in dog soap ____ 56
DDT may be outmoded ____ 216
Deaf use telephone ____ 345
Dean, R S ____ 197
Death and Resurrection ____ 239
Dehydrating process ____ 279
De-icers ____ 320
De-Jong, Russell N ____ 152
Dellinger, J H ____ 264
Demerec, Milislav ____ 217, 274
Denny, C S ____ 2
Deonier, C C ____ 36
Dershimer, Frederick W ____ 360
Despert, J Louise ____ 356
de Takats, Geza ____ 393
Detection device ____ 400
Detrick, H J ____ 281
Deutsch, Armin ____ 104, 120
Developing tank ____ 32
Dewitt, J H ____ 67
DFDT, more effective ____ 264
Diabetes and smoking ____ 359
Dial indicator ____ 304
Diamond wheels ____ 2
Die casting ____ 304
Dietary, insect ____ 285
Dietz, Catherine C ____ 229
Dietz, David ____ 201
Dihydrotachysterol ____ 157
DiMeglio, John ____ 137
Disease causes ____ 387
Distress signal ____ 96
Diving bell, deep sea ____ 280
Dodge, V. K ____ 57
Dog hysteria ____ 376
Dogdom, heroes of ____ 119
Doolittle, S P ____ 255
Doudoroff, M ____ 403
Douglas, Jesse ____ 274
Douglass, Patricia M. ____ 51
Dow, J B ____ 324
Dowdy, Andrew ____ 388
Downs, Cora M ____ 339
Draeger, R H ____ 294
Drafting instrument ____ 416
Dragstedt, Lester R ____ 367
Drill sharpener ____ 48
Dropsy, protein for ____ 376
Drugs for mental disease ____ 355
Drugs, new ____ 339
Drugs traced ____ 185
Dryden, L ____ 2
Drydocks, floating ____ 245
Drying, vacuum ____ 205
Dub, Leonard M ____ 361
DuBridge, Lee A ____ 388
Duck, decoy ____ 128
Duck stamp ____ 243
Dunham, Wolcott B ____ 214
Dunn, H K ____ 345
Dunn, R. E ____ 135
Dunning, John R ____ 41
Durand, William F ____ 13
Duster, double-acting ____ 96
Dyer, R E ____ 174

Eagle, bald ____ 414
Ear wardens ____ 329

SCIENCE NEWS LETTER

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Left out and insert in binder at beginning of volume

Earthquake ... 21
Earthquake detectors ... 231
Earthquake forecasting ... 62
Earthquake, Sumatra ... 316
Earthquakes and rain ... 366
Easter Island relics ... 83
Echo sounder ... 224
Eclipse, South American ... 396
Edwards, P W ... 72
Eel and radar ... 57
Egg decapper ... 128
Egg opening device ... 224
Eiler, John J. ... 345
Einstein, Albert ... 394
Eisner, Abner ... 41
Eklund, Henning W ... 324
Electric generator ... 16
"Electric hand" ... 176
Electric knife for surgery ... 181
Electric shock ... 216
Electrodes ... 25
Electromagnet ... 16
Electromagnetic cane ... 47
Electron microscope ... 101
Electronic instrument ... 64
Elements, new ... 148
Elements, new, named ... 243
Elements, new synthesized 211
"Elephant fish" ... 233
Elliott, Ewing ... 341
Elvehjem, C A ... 342
Emerson, R A ... 216
Emotional disturbances ... 325
Engine, gas turbine ... 360
Engine, greater speed ... 120
Engine, new ... 51
Engine, new solvents for ... 296
Engine, wasp protected ... 195
Engineers ... 328
Engines of future ... 106
Engstrom, William W ... 232
ENIAC ... 118
Envelope, transparent ... 416
Epidemic, postwar ... 131
Epilepsy remedy ... 152
Eraser, typewriter ... 208
Erasing machine ... 368
Erde, Bernard ... 308
Etro, Luis Enrique ... 84
Escamilla, Robert F. ... 132
Eskew, R E ... 72
Evans, John W ... 366
Evans, Walter ... 36
Eweson, Eric W. ... 77
Ewing, Maurice ... 55, 324
Extension for shaft ... 16
Eye trainer ... 288
Eyes, limitations of ... 312

Facial hemiatrophy ... 54
Fact and fancy ... 297
Fairbanks, Herbert S ... 38
Falk, K G ... 246
Fan attachment ... 48
Fan, Hsing-Yun ... 318
Farber, Eduard ... 329
FD-1 Phantom ... 41
Feathers, evolution of ... 92
Featherweight material ... 56
Feeblemindedness ... 365
Feldman, William H ... 339
Fellows, J R ... 238
Fellowships resumed ... 153
Fellowships, veterans ... 8
Fels, Samuel S ... 40
Felt hats, waterproof ... 283
Fennell, J L ... 62
Ferguson, R G ... 391
Fern, ostrich ... 259
"Ferrets" ... 43
Fertilizer, vitaminized ... 77
Fibers, synthetic ... 4
Film recorder ... 368
Filmeter ... 96
Finland, Maxwell ... 297
Fire-alarm, home ... 144
Firestone, Floyd A ... 118
Fish can drown ... 398
Fish, poisonous identified ... 135
Fish studied ... 248
Flash-bulb holder ... 345
Flash bulb, repeating 304, 336
Fleming, Alexander ... 340
Flesch, Peter ... 136
Flies, domesticated ... 205
Flounder, "left-eyed" ... 23
Floyd, George H ... 311
Flowers, spring ... 270
Flu research blind ... 37
Fluorescent lamps ... 47, 56
Flying laboratories ... 13
Flying records ... 375
Flying tests in storms ... 158
Fog dispenser ... 176
Fog generator ... 8
Fog turned to rain ... 276
Fontaine, Thomas D ... 255
Foote, Albert G ... 312
Ford, Edsel B ... 393
Ford, Frank ... 310
Ford, Henry ... 393
Forecasting radio ... 234
Foreign minerals ... 46
40 STS Winners ... 70
Foshay, Lee ... 117
Fossils ... 2, 3, 25, 46
Fountain pen ... 272
Fowler, Edson F ... 393
Fox, Leon A ... 18
Fox, Max J ... 156
Fox, Sydney ... 251
Frames, cold ... 64
Francis P Garvin medal ... 313
Francis, Thomas, Jr ... 42, 326
Franklin medal ... 310
Frazier, William C ... 217
Fred, E B ... 174
Freeman, H B ... 198
Freezer, home ... 384
Frieden, Edward H ... 260
Frisch, O R ... 395
Frischhertz, N F ... 13
Frowe, Eugene ... 280
Fryers in any season ... 259
Fuel, cold starting ... 288
Fuels for diesels ... 38
Fuel gauge, electron ... 32
Fuel, new ingredients in ... 93
Fuller, R Buckminster ... 201
Fungus-spore blasting ...
Furer, Julius ... 18
Furnace, burner for ... 87
Furnace, oil-burning ... 368
Furnas, C C ... 41

Gadebusch, H M ... 38
Galaxies, only 11 billion ... 84
Galtsoff, Paul S ... 73
Gammon, George ... 181
Garand rifle copied ... 194
Garber, Franklin ... 329
Garden favorites ... 228
Garman, Harold A ... 75
Garner, Clement L ... 312
Garnett, Maxwell ... 149
Gas deodorized ... 312
Gas masks, medical ... 260
Gas, new in atmosphere ... 83
Gas turbines for ocean liners ... 185
Gas turbines, more power ... 77
Gasser, Walter ... 180
Geisse, John H ... 152
Geoghegan, Henry ... 72
Geographical groundwork ... 312
Geological servicemen, get retraining ... 121
Geology in war ... 2
George, D E. ... 245
Gerard, John ... 314
Gerber, Isadore E ... 104
Germ killers, useless ... 182
Germ warfare ... 18, 19, 22
German measles in pregnancy ... 151
German technology probed ... 279
Germany's progress ... 389
Germs, in tests ... 247
Gernandt, Waldo G ... 392
G I fellowships ... 8
Gibbs, Erna L ... 183
Gibbs, Frederic A ... 183
Gibsen, K F ... 62
Gibson, R E ... 218
Gilman, Alfred ... 181, 190, 200
Gilman, G W ... 281
Gilmore, Marion H ... 231, 358
Glass, Arnold ... 219
Glass ... 344
Glass, drinking ... 240
Glass fibers ... 14
Glass, glareless ... 132
Glass, new ... 59
Glasses ... 52
Glaucoma weapon ... 181
Glen, Earl W ... 148
Globe, plastic ... 368
Glove, rubber ... 176
Glow tube, crater type ... 16
Goddard, Robert H ... 292, 307
Gold alloy, low-melting ... 147
Gold plating, measured ... 121
Goldberger, Joseph ... 342
Goldberger, Lewis A ... 157
Goldblatt, Harry ... 259
Golden, Milton J. ... 255
Goldsmith, E D ... 389
Goldstein, Kurt ... 134
Goldzieher, Joseph W ... 309
Golf tee ... 144
Goodman, L S ... 190
Goodpasture, E W ... 42, 292
Goodrich laboratories ... 41
Goop reduces fire ... 149
Gopher, albino ... 149
Gorbman, Aubrey ... 282
Gordon, Harry A ... 232
Govaertz, J ... 312
Graef, Carlos ... 84
Graef, Edith ... 308
Graham, Clarence H ... 274
Grain sorghums ... 392
"Grand canyon," Miss ... 281
Grass cutter ... 352
Gravity conveyors ... 192
Grayson-Smith, H ... 265
Green, D H ... 38
Greenberg, David M ... 405
Greenhill, Maurice H ... 355
Greibach, E H ... 52
Griffith, J Q, Jr ... 84, 246
Griffiths, Henry ... 174
Griffiths, W T ... 278
Grinding wheels, hardest ... 2
Grinker, Roy ... 343
Gripping device ... 32
Groody, Mary ... 376
Grosse, Aristid V ... 25
Groundhog ... 77
Groves, L R ... 212
Grubb, Thomas C ... 339
Guano industry threatened ... 111
Gudger, E W ... 23
Guggenheim Medal ... 72
Gun, line-throwing ... 272
Gunsight ... 48
Guthrie, James E ... 5
Guzman, Ana Rosa ... 152

H-4, Hughes ... 3
Haas, Victoria ... 29
Hacksaw holder ... 112
Hagen, Clarence R ... 313
Hagenbuch, C C ... 405
Hahn, O ... 395
Hailstones ... 319
Haines, P G ... 41
Hair curler ... 128
Hair retainer ... 144
Hale, M W ... 174
Hall, Joseph M. ... 360
Hallenback, G. A ... 230
Haller, H L ... 275
Hallborg, Henry E ... 377
Halligan, William J ... 155
Hamburger, Morton ... 217
Hamilton, Joseph G ... 104
Hamner, Charles M ... 285, 397
Hammon, W McD ... 130
"Hams," radio ... 154
Hancke, Lewis ... 312
Hand, Irving ... 376
Hand washing machine ... 128
Harkins, William D ... 278
Harm from germ warfare ... 21
Harnley, M H ... 389
Harrington, Daniel ... 2
Harris, Daniel ... 210
Harrison, A E ... 154
Hartnell, Elinor D ... 247
Hasler, Arthur D ... 248
Hassid, W Z ... 403
Hatcher, D B ... 246
Hawks, Lloyd C. ... 75
Hayfever cures ... 285, 397
Hazen, Wayne Eskett ... 287
Headache relief ... 309
Headley, Nathan E ... 147
Health leads, new ... 262
Heart action record ... 361
Heart beat in dogs ... 103
Heart disease symptoms ... 396
Heat control device ... 352
Heater, electric ... 32
Heating system, new ... 93
Heavy carbon ... 25
Hecht, H H. ... 361
Heckert, W W ... 56
Heldt, Thomas J ... 355
Helicopter, largest ... 133
Hemoglobin manufacture ... 405
Hemoglobin, production speeded ... 175
Hemophelia, remedy for ... 323
Hemphill, Josephine ... 314
Hench, Philip S. ... 147
Henderson, E P. ... 201
Hennessy, D J. ... 246
Henry, Franklin ... 360
Henry, Thomas R ... 201
Hens need lime ... 398
Henschel, Austin ... 376
Herbal of Rufinus ... 73
Heredity units, act as models ... 264
Herrell, W E ... 214
Herzberg, G ... 371
Herzstein, Joseph ... 359
Hess, H H ... 358
Heuser, G F ... 175
Hickman, C N ... 218
Higgins, Elmer ... 116
Highway accidents ... 326
Highway plans ... 38
Hildebrand, E M ... 264
Hill, Thomas J ... 200
Hillier, James ... 403
Hiltner, W A ... 371
Hodson, A C ... 318
Hoe, garden ... 384
Hogan, A G ... 182
Hohl, Leonora ... 373
Holden, Francis R ... 280
Holtman, D F ... 100
Home, circular ... 201
Honey, how to thin ... 124
Honwood, Murray P ... 339
Hoobler, Icie Macy ... 313
Horses, thoroughbred ... 57
Houses, concrete ... 280
Houses, paper ... 169
Houseflies in research ... 216
Hovde, F L ... 218
Howard, Walter L ... 317
Hrieghbaum, Hillier ... 74
Hubble, Edwin P ... 84
Hunsaker, J C ... 328
Hurwitz, Ruth E ... 183
Hussey, George F ... 371
Hutcheson, J A ... 150
Hutton, Richard ... 60
Hydraulic attachment ... 419
Hydrogen peroxide ... 5
Hygrometer, electric ... 368
Hymas, F C ... 56

Ice auger ... 144
Iceberg patrol ... 182
Ichneumon fly ... 196
Ignition system ... 315
Iler, Ralph K ... 398
Impressions, plastic ... 86
Impurities, detected ... 255
Incubators ... 208
Indians, ancient ... 406
Indicator, air-speed ... 272
Influenza epidemic ... 8
Infantile paralysis ... 313, 332
Influenza protection ... 42
Influenza vaccination ... 326
Inkwell, nonspillable ... 176
Insect-killing bombs ... 136
Insecticide controls boll weevil ... 203
Insects absorb water ... 312
Insects in atom test ... 395
Insects, motherless ... 153
Insects, teen-age ... 350
Insects, winter habits of ... 102
Institute, nuclear study ... 393
Insulin ... 326
Intestinal 'Flu mystery ... 406
Iron lung ... 325
Iron oxide magnet ... 9
Ironing board cover ... 320
Irons, J V ... 340
Irving, George W ... 255
Isberg, Emil M ... 131

Jack-in-the-pulpit ... 275
Jaffee, Robert I ... 147
Jann, Gregory ... 340
Jansky, K G ... 68
Jansma, Elizabeth ... 71
Jap prisoners ... 363
Japan's secret weapon ... 18, 19
Jeep ghost ... 150
Jenkins, Dubois L ... 174
Jensen, A V ... 183
Jet engines ... 13
Jet-propelled plane ... 41
Jewett, Frank B. ... 236
Jewett, Gladys M ... 12
Jillson, W R ... 57
John Phillips Medal ... 323
Johnson, Balbina A ... 51
Johnson, Edwin A ... 340
Johnson, Marvin J ... 217
Jones, F L ... 59
Jones, Franklin D ... 121
Jones, H A. ... 36
Jones, Sir Harold S ... 24
Jonxis, J H P. ... 293
Jordan, Paul ... 393
Jordan valley ... 168
Jorgenson, Helen ... 183
Josey, Allen I ... 396
Josie and Trixie ... 119
Junowicz-Kochalaty, Renate ... 340
Jupiter, molecular band ... 371
Juvenile delinquents ... 361

Kaempffert, Waldemar ... 201
Kallmann, Franz J ... 365
Kamen, Martin ... 29, 405
Kapitza, Peter L ... 274
Kaplan, Joseph ... 153
Kapp, Frederick T ... 364
Karasch, Morris S ... 274
Kass, Sholom ... 311
Kay, H D ... 331
Keefe, Kenneth ... 105
Keefer, Chester S ... 293, 326
Kellett, Captain H ... 40
Kelly, Thomas J ... 75
Kelner, Albert ... 340
Kelser, R A ... 174
Kennedy, George F ... 312
Kentucky mine disaster ... 2
Kelby, F G ... 233
Kernen, Jules ... 163
Kerr, William J ... 135
Kerst, D W ... 265
Kesel, Robert G ... 117
Keys, Ancel ... 293, 376
Khlopin, Vitaly ... 104
Kik, M C ... 137
Kincel, J B ... 358
King, Joseph E ... 297
King, P Z ... 13
Kirch, Ernst R ... 117
Kirk, Norman T ... 119
Kirkpatrick, Barbara B ... 355
Klein, Henry ... 413
Kneberg, Madeline ... 406
Knife rack ... 336
Knife, rotary ... 48
Knott, John R ... 365
Kocholaty, Walter ... 340
Koelle, George B ... 181
Koenig, W ... 345
Kolthoff, I M ... 350
Komorov, S A ... 40
Kopal, Zdenek ... 82
Kornblith, Borris A ... 199
Kosanka, Robert M ... 2
Kowal, S F ... 339
Kozol, Harry L ... 365
Kramer, C F ... 233
Krantz, John C, Jr ... 218
Kratzer, J C ... 38
Krech, David ... 359
Kriegel, M W ... 83
Kroeber, A L ... 356
Kroon, R P ... 77
Krueger, Albert Paul ... 37
Krypton gas for disease ... 136
Kryter, K D ... 329
Kuntz, J E ... 217
Kurbatov, J D ... 211
Kusaka, Shuichi ... 287

Lace-wing fly eggs ... 179
Lacy, L Y ... 345
Ladenburg, R W ... 345
Laidlaw, P ... 42
Lal, Gobind Behari ... 201
Lamanna, Carl ... 324
Lamme medal ... 201
Lamson, R T ... 66
Land, Emory S ... 349
Landings, safer ... 284
Lang, F R ... 294
Lang, Gregory ... 25
Langewiesche, Wolfgang ... 393
LaPaz, Lincoln ... 47
Lashley, Karl Spencer ... 274
Lathe, glass-working ... 121
Laurence, William L ... 201
Lawn mower ... 160
Lawrence, Ernest O ... 291
Lawrence, John H ... 104, 136
Lawton, George ... 200
Lebedev, Alexander ... 101
Leclercq, J. ... 312
Leite de Castro, C. ... 312
LeMay, Curtis E ... 99
Lemon, Henry M ... 217
Lennox, William G ... 365
Lens, Coast Guard ... 181
Lens, image correcting ... 416
Lenses, plastic ... 6
Leopold, Irving H. ... 181
Lepkovsky, Samuel ... 265
Lewis, T M N ... 406
Lewontin, Richard ... 163

Libby, W F ---------- 247
"Lie detector" ---------- 207
Life processes ---------- 387
Lignin ---------- 329
Lilienthal, David E ----- 214
Lilies, Easter ---------- 230
Lindskog, G E -------- 190
Link, Karl Paul ---------- 274
Links, magnetic -------- 384
Lippincott, Stuart W --- 232
Liquids dehydrated ------ 360
Lisser, Hans ---------- 132
Little, Clarence C ------ 39
Loading device --- --- 96
Locomotives, coal turbine- 284
Loeb, Robert F ---------- 274
Long, Esmond Ray ------ 274
Long, J R ---------- 197
Longcope, Warfield T -- 200
Lonsdale, Kathleen ------ 319
Loran guides bombs ---- 357
Loran, self-guided ------ 87
Losey, R M award ---- 60
Loudspeaker ---------- 112
Love, Donald P -------- 345
Love, J Grafton -------- 373
Lovejoy, F W --------- 139
Lovell, C A ---------- 361
Lowdermilk, W C ------ 361
Lowenbach, Hans ------- 355
Lowenfeld, Berthold ----- 25
Lubricants, synthetic --- 38
Luetscher, John A ------ 200
"Lung," plastic -- -- -- 176
Lushbaugh, C ---------- 190
Lynn, L H ---------- 127

Macelwane J B -- ---- 62
Machine gun fire
speeded up ---------- 184
Mackay, Dorothy -- ----- 377
MacKenzie, K R ------- 211
MacKinnon, Donald W --- 26
Macleod, J ---------- 57
Macy, Barbara Ann ----- 329
Maeth, Harry ---------- 38
Magill, T P ---------- 42
Magnesium alloy -------- 389
Magnetic detector ------ 374
Magnet ---------- 9
Maison, G L ---------- 230
Makins, Roger M ------ 310
Malaria ---------- 30
Malaria cure, positive --- 263
Malarial treatments ----- 232
Mallina, Rudolph F ---- 121
Manhattan District ------ 387
Manicurist, electric ---- 128
Manley, Terris A ------- 392
Mann, William M ---- 8, 105
Manning, J J --------- 53
Map, circulation -------- 300
Map, glacial, N A ------ 312
Maps, aeronautical ------ 105
Marble, Alexander ------ 232
Mariners' pathfinder ---- 359
Marth, P C -------- --- 229
Martin, Ernest E ------ 230
Martin, Fredericka I ---- 72
Material, featherweight -- 288
Maurer, Fred D --------- 174
Maxwell, Harry P ------ 183
May flowers ---------- 221
Mayer, Joseph E ------ 274
Mayer, Waldemar F --- 268
McCoy, Elizabeth -------- 217
McDaniel, P W --------- 393
McElroy, Olive E ------ 324
McKay, H A C --------- 9
McKinley, D W R ----- 104
McLaughlin, Dean B ---- 120
McMillan, Edwin M -----291
McMillan, William George 287
Meads, Manson -------- 297
Measurement standard -- 242
Medical heroes ----- ---- 74
Medical memorial fund --- 329
Meiners, E P ---------- 415
Meinesz, F A Vening --- 3
Meitner, Lise ------ 167, 375
Meleney, F L ---------- 51
Memorial Day ---------- 335
Mendel, Gregor -------- 366
Menninger, William C ---- 343
Mental causes for ills ---- 343
Menzel, Donald H ------ 366
Merchant, Reuben --- 103, 154
Merck, George W ---18, 19, 22
Mercury and Venus ----- 122
Mercury, planet -------- 411
Mercury chlorine cell --- 27
Merrill, A E ---------- 66
Merrill, Paul Willard ---- 274
Meschter, Emery ------- 308

Messinger, Bernard L --- 13
Metallic silver ---------- 329
Metallic titanium uses -- 197
Meteorites ---------- 47
Meteorites, fall of ------ 281
Meteorites menace ------ 153
Meteorites, structure ----- 201
Meteors reported ------- 299
Metraux, Alfred -------- 83
Mice, unborn have young 51
Michelson, Albert A ---- 345
Mickelsen, Olaf -------- 376
Micrometer, optical ----- 208
Microphone in tube ---- 8
Microphone, throat ------ 52
Microscope, Electron ---- 403
Microscope, phase ------- 390
Microwaves, use of ---- 103
Mikesell, Alfred ---------- 372
Mikhailov, A ---------- 24
Milk ---------- 331
Milk poisoned by D D T -- 5
Milky Way ---------- 210
Milas, Nicholas A ----- 35
Military geology -------- 2
Mine-detector, non-metal- 87
Mirror, rear view ------ 251
Mitchell, C A ---------- 174
Mitchell, John W ------ 229
Mixter, George W ------ 188
Molecules, busy -- -------- 327
Molecules, in rubber ---- 243
Molecules, secrets of ----- 102
Molecule, virus --------- 137
Molitor, Dr Hans ------ 182
Molten metals, de-gassed- 159
Monahan, A C ------106, 186
250, 378
Monnet, George --------- 317
Moon, contact with ------ 67
Moon, man-created -- 350, 376
Moore, J W -- -- --- 328
Moore, Joseph Earle ---- 277
Moore, N Hunt -------- 219
Mop, dusting --- -- -- 256
Morgan, Agnes Fay- 216, 265
376
Morgan, Arthus H ------ 219
Morrow, Martha G --234, 298
Morton, H S ---------- 68
Morton, Harry E -- -- -- 340
Motion picture machine-- 400
Motor oil ---------- 9
Mouth rinses ---------- 117
Movies for airplanes ---- 80
Moyer, James C -------- 205
Muller, J F ---------- 361
Munk, W H ---------- 358
Murphey, Francis ------ 396
Murphy, J N Jr ---- 340
Murray, Allen E -------- 308
Murray, E G D -------- 174
Murray, H A ---------- 26
Music sheet turner ----- 80
Musical sound imitator -- 361
Muzzle attachment ------ 345
Myerson, Abraham ------ 365
Myosmine ---------- 41

Nagy, Rudolph ---------- 47
Nail file, electric -------- 48
Nailler, C R ---------- 405
Napalm, soap from ------ 219
NAS elections ---------- 274
Nassau, J J ---------- 210
National Academy medal- 274
Nautical almanac ------ 188
Navigation, "blind" ---- 66
Nazi patents ---------- 319
Nazi struggle, index to--- 198
Nelson, Oliver E -------- 361
Nelson, W ---------- 389
Nerve cutting operation-- 367
393
N Y-Moscow radio ---- 377
Newest duplex ---------- 372
Newkirk, Gordon -------- 163
Nichols, D R ---------- 214
Nichols Herbert B ------ 201
Nicholson, Seth B ------ 220
Nickerson, Mark -------- 250
Nielson, J M ---------- 356
Nininger, H. H -------- 281
Nitromethane ---------- 246
Non-petroleum oil ------- 9
Norling, J A ---------- 311
Norris, L C ---------- 175
Norris, L D ---------- 415
Noss, Helen T -- -------- 281
Nuclear energy study ---- 393
Nuts easily cracked ----- 59
Nylon cups ---------- 64
Nylon dye ---------- 24
Nylon hoop ---------- 73
Nylon, many uses for ---- 56
Nylon sheeting, solid ---- 262

Oak Ridge Institute ----- 393
Oaks, Orion O ---------- 93
Observatory, USSR ------ 24
Ocean weather ---------- 311
Oceanic layer ---------- 344
Octave Chanute award -- 66
Odom, Eugene P -------- 216
O'Donnell, Joseph F --- 117
Oestvedt, Anne S ------- 71
Oginsky, Evelyn L ------ 340
Oil refiner ---------- 352
Oil, synthetic ---------- 371
Old age, postpone ------- 135
O'Neill, Hugh -------- 172
O'Neill, John J -------- 201
Operation Crossroads --- 325
329
Oppenheimer, J Robert--214
287
Optical instruments ----- 6
Orthojector ---------- 24
Ory, Edwin M ---------- 297
Oster, Kurt A ----- ---- 255
Osterhoudt, Walter J --- 281
Owston, P G ----- 309, 319
Oxygen indicator -------- 272
Oxygen, liquid ---------- 265
Oxygen, obtaining ------ 184
Oyster, Jap ----------73

P2V Neptune ---------- 23
P-80, maximum speed ---- 235
P-80 Shooting Star -- -- 13
Pacent, L G -- -------- 52
Pad, heating ---------- 240
Page turner --------- --- 416
Paint, fire retardant -- - 365
Paint, new white ------ 390
Panama canal, channel --- 79
Panoramic screen ------ 265
Pape, N R ------ - --- 243
Papkovich, Peter -- -- 121
Para-aminobenzoic acid -- 344
Parachute, hemispherical- 208
Parasol --------- -------- 272
Parfentjev, Ivan A ------ 221
Particutin ------ -------- 361
Parking, off-street ------ 139
Parran, Thomas --18, 117, 392
Parsons, Helen T ------- 281
Pasternack, A B ------- 117
Patterson, Robert P ----- 244
Pauli, Wolfang -------- 287
Pauling, Linus ------102, 327
Pearl, Pleistocene age --- 216
Peat processing machine--- 168
Peet, Max M ---------- 131
Pegram, George B ------ 374
Pellagra threat -------- 342
Penfound, William T. ---- 297
Penicillin -- 6, 9, 147, 214, 217
277, 280
Penicillin injections ---- 168
Penicillin protected ------ 51
Penicillin supply -------- 217
Penicillin synthetic ----6, 219
Penicillin X ---------- 297
Penrod, Kenneth E ----- 230
Penrose Medal ---------- 3
Pentolite, unscrambled -- 137
Perfume ---------- 12
Perfumed world, our ----- 298
Periscope, parking ------ 336
Peroxide ---------- 5
Perrier, C ---------- 211
Perry, S H -------- 201, 274
Peruvian city ---------- 397
Peterson, W H -------- 217
Phase-difference micro-
scope ---- -- -------- 390
Phosphors ---------- 47
Photographic papers ----- 169
Photosynthesis ---------- 387
Piano, toy ---------- 256
Pick, Lawrence A ------ 311
Pictures, 3-dimensional -- 311
Pierce, J A --------87, 357
Pierce, John B.---------- 93
Pig-brooder, electric ---- 160
Piggot, Charles S ------ 274
Pigment, new ---------- 136
Pilot plant, laboratory -- 400
Pilotless bomber -------- 9
Pilots "talked down" ----- 261
Piotrovsky, Boris -------- 168
Piston, cooled ---------- 180
Pituitary gland, cancer -- 296
Plane, folding-wing ------ 152
Plane, power-driven ----- 256
Planets, four visible ----- 202
Plant diseases in war ----- 22
Plant growth regulators -- 264

Plant patents ---------- 54
Plasmochin ---------- 30
Plastic-coated yarn ------ 24
Plastic, lightweight ---- 233
Plastics ---------- 4, 14
Plastics, properties of -- 133
Plastics, quick-molded -- 6
Platzman, Robert L ----- 287
Plexon ---------- 24
Plow, combination ------ 48
Plow, firefighting ---- - 208
Plutonium ---------- 28, 391
Plutonium "denatured" -- 212
Plywood plane ---------- 3
Pneumonic plague ------ 37
Poison ivy remedy ---- 303
Poisoning, treatment ---- 35
Polio in Florida -------- 332
Polio susceptibility ----- 100
Politicians' characteristics 335
Pollard, W G ------288, 393
Polyphemus moth ------ 360
Pomerat, Charles M ----- 260
Ponder, E ---------- 57
Pool, Marion L --------- 211
Popkin, George L ------- 309
Potatoes dried -------- 374
Potatoes, well-bred -- - 314
Potter, Robert D ------- 201
Potts, Lewis E -------- 372
Powder, for cleaning
carpets ---------- 96
Power lines for phone -- 87
Powers, Donald H ----- 232
Prehistoric hunting ----- 3
Prescription for peace - 90
Prianishikov, Dmitri--101, 267
Price, C W ---------- 344
Price, Charles C ----57, 308
Price, Echo L --------- 281
Prickett, R ---------- 24
Prime, N S ---------- 18
Prince, David C ------- 201
Printer, rotary new ----- 112
Productive life longer --- 310
Projector-viewer -------- 64
Promin ---------- 308
Prominence, giant ------- 82
Propeller, fan type ----- 393
Prostigmine ---------- 15
Proudfoot, Don A ------ 345
Proximity fuze -------- 130
Puetzer, Bruno -------- 339
Pulaski, E J ---------- 51
Pulkovo Observatory ----- 23
Push-button flying ------ 115
Pyle, Norman ---------- 18

Quadruplets in sky ------- 58
Questions, odd ---------- 95
Quetzals ---------- 8
Quig, J B ---------- 4

Raab, Walter ---------- 377
Rabi, I I ---------- 274
Rabut, Cecile ---------- 71
Radar, anti-collision ---- 135
Radar developments ----- 264
Radar, echo in ---------- 9
Radar, ground targets -- 280
Radar improved -------- 108
Radar, peacetime ------ 127
Radar umbrella -------- 96
Radar scope ---------- 67
Radiation injury study --- 294
Radiation sickness ----- 159
Radio, coin-operated ---- 352
Radio hams ---------- 374
Radio, revolution in ----- 316
Radio waves absorbed ---- 295
Radio waves, escaped -- 66
Radio waves, focussed -- 296
Radioactive carbon ------ 415
Radioactive tracers ----- 387
Radioisotopes --------387, 406
Radiophone ---------- 284
Radio-telefax ---------- 368
Radiotelephone ---------- 134
Rainmaker ---------- 373
Rake, Geoffrey ---------- 214
Ram Jet ---------- 371
Randall, Robert H ------ 312
Randall, W A ---------- 344
Rantz, Lowell A -------- 388
Raskind, Josephine ------ 163
Rats ---------- 25
Rattlesnake buried ------ 375
Razor blade sharpener --- 112
Razor, safety, floats ---- 192
RDX ---------- 221
Rear-engine cars -------- 38
Receiver, radio --------- 288
Recording, direct -------- 37
Rectifier ---------- 272
Reed, J B ---------- 174

Reeves, W C --------82, 130
Reflectoscope ---------- 118
Regier, Arthur A ------ 393
Regna, Peter P -------- 246
Reichard, J D -------- 355
Reimann, Stanley P ----- 25
Research Center -------- 393
Research programs ----- 249
Resources, hidden ------ 252
Rex, Daniel F ---------- 232
Reyniers, J A ------37, 229
Rhoades, Marcus M ----- 274
Rhoads, Cornelius P ----- 39
Riboflavin ---------- 350
Rice, J B ---------- 307
Rich, John L ---------- 244
Richardson, R L -------- 182
Richardson, William L -- 198
Riess, Bernard F ------ 25
Rinderpest vaccine ------ 248
Ripcord, automatic ------ 230
Risley, Thomas C ------ 393
Road building ---------- 328
Robbins, Frieda S ------ 119
Roberts, Richard -------- 371
Roberts, Royston M --57, 308
Roberts, W O --------- 297
Robey, Thomas C ------ 174
Robinson, A H -------- 24
Rochow, Eugene G ------ 24
Rock, Sibyl M ---------- 405
Rocket, counter-attack -- 198
Rocket device patent ----- 292
Rocket Motor, powerful -- 294
Rocket, V-2 307, 313, 328, 342
Rockwell, George E ----- 339
Rodebush, W H ------ 260
Roeder, Kenneth D ----- 217
Rohrer, Marilyn -------- 163
Roller bearing, spherical-- 384
Romano, John ---------- 364
Rongerik ---------- 343
Roomheater, electric ----- 352
Roosevelt, Franklin D --- 75
Rose, Albert ---------- 312
Rosenbaum, Milton ------ 364
Rosette plants ---------- 44
Ross, Ron ---------- 154
Rotary drill ---------- 16
Rotascope ---------- 31
Rotbart, David -------- 372
Rothman, Stephen ------ 136
Rothstein, Jerome ------ 8
Royal Society Medal ----- 152
Rubber hose ---------- 176
Rubber in Germany ----- 190
Rubber industry -------- 41
Rubber, lag in ---------- 148
Rubber rings ---------- 368
Rubber, synthetic ------ 278
Ruben, Samuel ---------- 29
Ruble award ---------- 104
Rucker, C Wilbur ------ 373
Rusk, Howard A ------ 286
Russell, Henry Norris ---- 94
Russell, W L ---------- 51
Russian scientists ------ 350
Rutin, production of ---- 84

Safety device, gas burner 128
Saint, S P ---------- 13
Salk, Jonas E -------- 326
Salle, A J. ---------- 340
Salt and pepper shaker -- 320
Sanchez, Pedro C ------ 312
Sands, Walter ---------- 324
Sarles, W B ---------- 18
Sarnoff, David ---------- 195
Savage, John Lucian ----- 168
Sawyer, Ralph A ------ 309
Sayers, R R ---------- 374
Saylor, Charles P ------ 390
Scatchard, George ------ 274
Schatz, Albert ---------- 138
Scheerer, Martin -------- 134
Schoening, H W ------ 174
Schonland, B F J ------ 249
Schultz, Leonard P ----- 135
Schweid, Abraham ------ 163
Sciascia, M ---------- 329
Science, blind spots of -- 215
Science fellowships ----- 153
Science, future of ------ 236
Science-Govt cooperation- 287
Science, our future ----- 163
Science previews -------- 10
Science scholarships ---- 163
Science Talent Institute -- 150
Science talent problems -- 170
Science talent questions -- 89
Science talent winners -- 69
Science writing award--57, 201
Scientists and peace ---- 210
Scleroderma weapon ----- 157
Scott, M. L ---------- 175

Scott, Robert G ---- 86
Screwdriver ---- 224
Screwdriver, leverage ---- 64
Scrub typhus ---- 344
Seaborg, Glen T --23, 28, 163, 211, 243, 248, 282, 405 406
Sears, W N ---- 136
Seaweed in industry ---- 199
Seaweed waterproofs ---- 62
Secret agents, selecting ---- 26
Seeds in atomic test ---- 395
Segre, Emilio ---- 211
Seismograph ---- 358
Sellards, E H ---- 3
Settle, H B ---- 131
Shackell, L F ---- 205
Shaker, mechanical ---- 64
Shamrock ---- 172
Shannon, James A ---- 263
Shapley, A H ---- 297
Shapley, Harlow ---24, 85, 206, 268, 310, 376
Sharbaugh, A Harry ---- 374
Shark, bramble ---- 137
Shay, Harry ---- 40
Sheathing, metal ---- 32
Shechter, Harold ---- 246
Shedlovsky, Theodore ---- 86
Sheng, T S ---- 183
Sherman, Henry Clapp ---- 310
Sherman, Kenneth L ---- 196
Shibuya, Madoka ---- 340
Shields, magnetic grip ---- 352
Shock absorbers ---- 320
Shoe heel ---- 384
Shoemaker, F G ---- 38
Shope, Richard E ---- 174
Shoran ---- 314
Shower curtain ---- 400
Sicular, Arthur ---- 163
Silicone oils ---- 24
Silicosis, protection ---- 280
Silver polishing ---- 364
Silverman, Alexander--185, 344
Simha, Robert ---- 196
Simmonds' disease ---- 132
Simms, Henry S ---- 329
Simonpietri, Andre C ---- 312
Siplet, H ---- 40
Sleeping berths ---- 160
Sleeping sickness ---- 130
Sleeping sickness virus ---- 82
Slide mount ---- 16
Slide rule, vest-pocket ---- 288
Slocum, P. D ---- 54
Slotin, L ---- 415
Smallpox on West Coast ---- 232
Smith, E A ---- 25
Smith, Frederick G --285, 397
Smith, George A ----179, 328
Smith, Perry C ---- 403
Smith, W ---- 42
Smoke-pots ---- 301
Smoke, study of ---- 412
Smyth, John B ---- 404
SN 7618 ----30, 307
Snake, eggs laid ---- 184
"Snakes", Army ---- 52
Snakes bury in sand ---- 375
Snell, A H ---- 415
Snow balls, wind-rolled ---- 131
Snow-king ---- 124
Snow tractor ---- 160
Soap dispenser ---- 368
Soap sheets ---- 64
SODAR ---- 281
SOFAR ----55, 324
Soilless farms ---- 341
Somov, Mikhail ---- 313
Sonar ---- 231
Sonneborn, Tracy M ---- 274
Sorting machine ---- 8
South African research ---- 249
Soviet scientist ---- 267
Sparkplugs ---- 25
Spaulding, Earle H ---- 229
Spectrometer, reading ---- 16
Speed and altitude shown 116
Speidel, C C ---- 100
Sperry, L award ---- 60
Spider bite cure ---- 15
Spider, black widow ---- 382
Spiders ---- 341
Spier, Leslie ---- 274
Spies, Tom D ---- 233
Spinach juice ---- 217
Spine trouble ---- 396
Spot welder tweezer ---- 256
Spurious echo ---- 9
Stafford, Jane ---- 30, 42, 119, 138, 174, 201, 259
Stairway, disappearing ---- 192
Stalin award ---- 121
Standards changed little ---- 153
Star, new, visible ---- 104
Star, recordings ---- 73
Starfish, cycles of ---- 393
Starvation strategy ---- 22
Static eliminator ---- 80
Stebbins, Dr Joel ---- 85
Steel balls ---- 328
Steel, black stainless ---- 126
Steel sheets ---- 207
Steel, tool ---- 224
Steele, J Murray ---- 329
Steering wheel cover, heated ---- 192
Steiner, A B ---- 62
Stepladder, adjustable ---- 64
Stevens, Stanley S ---- 274
Stewart, R A ---- 247
Stimson, Henry L ---- 19
Stirling apparatus ---- 32
Stokes, Joseph ---- 332
Stokley, James --58, 122, 202, 266, 330
Stone, Marshall ---- 150
Stopper, overflow ---- 208
Storage, liquefied gas ---- 224
Stotz, Elmer ---- 205
Stout, William B ---- 38
Stowman, Knud ---- 131
Strapping, steel ---- 112
Strassmann, F ---- 395
Strauss, Reuben ---- 260
Street, John N ---- 190
Streptococcal vaccine ---- 388
Streptomycin ----39, 138
Streptomycin, key ---- 229
Streptomycin, beef for ---- 326
Streptomycin dosage ---- 344
Streptomycin uses ---- 293
Stromberg, Elis ---- 372
Strong, Leonell C ---- 296
Struve, Otto ----85, 104, 371
Studies, international ---- 268
Studler, Rene R ---- 184
Sturm, Ralph E ---- 230
Sub menace lessened ---- 55
Submarines, air in ---- 9
Submarines atom powered 392
Sugar Foundation Prize ---- 403
Suits, Chauncey Guy --140, 274
Suits, all-wool ---- 168
Sulfite liquor ---- 36
Sumerford, W T ---- 216
Sun, emissions ---- 297
Sunspot cycles ---- 220
Sunspots, large group ---- 99
Superpressure apparatus ---- 16
Surf forecasters ---- 123
Sverdrup, Harold U --123, 358
Sweater dryer ---- 112
Sweet-potato starch ---- 118
Syphilis, long fight ---- 199

T Coronae Borsalis ---- 104
1080 ---- 310
1080 harmless to fish ---- 297
2 4-D ----229, 397
T-13 ---- 413
Table top, card ---- 240
Tablet box ---- 80
Taft, Charles H ---- 185
Talent for numbers ---- 134
Talking books ---- 25
Tanaka, Tyozaburo ---- 341
Taylor, Alfred ---- 246
Taylor, F H L ---- 376
Taylor, Henry L ---- 376
Taylor, Hugh S ---- 249
TDE for mosquitoes ---- 35
Technical, opportunities many ---- 155
"Teflon" ---- 227
Telephone, push-button ---- 121
Telescope given Harvard ---- 366
Telescope, tank ---- 240
Television, airborne ---- 195
Television camera ---- 336
Television from sky --157, 378
Television pictures ---- 270
Television receiver ---- 304
Television transmission ---- 36
Telford, Horace S ---- 5
Tennessee STS ---- 301
Tensile strength, increased 232
Terman, Frederick E ---- 274
Terrain diagram ---- 2
Terrain models ---- 24
Testing machine ---- 5
Testing machine, giant ---- 304
Tests, simultaneous ---- 204
Theodorsen, Theodore ---- 393
Thermometers, speed ---- 86
Thickstun, W R ---- 158
Thiourea ---- 389
Thomas, Charles Allen ---- 214
Thomas, Evan W ---- 199
Thomas, James L ---- 153
Thompson, D Wentmore 274
Thompson, George N ---- 356
Thompson, Gershom J ---- 168
Thompson, Richard ---- 340
Thone, Frank--21, 22, 201, 314, 362
Thorndike, Lynn ---- 73
Tickets, printed ---- 152
Ticks, warning against ---- 249
Tidal wave path ---- 349
Tierney, Nicholas A ---- 344
Time-switch clock ---- 128
Timmers, M ---- 105
Timmes, Joseph J ---- 159
Tires, metallic ---- 400
Tizard, Henry Thomas ---- 310
Toads, Surinam ---- 147
Tobacco ---- 41
Tobias, Cornelius ---- 104
Toe mitt, knitted ---- 96
Tomato, new ---- 62
Tool, power ---- 224
Tool, winding ---- 224
Tooth decay ---- 413
Tooth decay prevention ---- 200
Toothbrush attachment ---- 256
Top, jet-propelled ---- 192
Top, toy ---- 208
"Torpedo" hunts mines ---- 198
Townes, Henry K ---- 196
Tracer, Carbon 13 as ---- 29
Tracer chemicals ---- 104
Tracks, tire ---- 288
Tractor ---- 4
Trakowski, Albert C, Jr 311
Transmissions, radio ---- 404
Transmitters, VHF ---- 248
Traugott, Paul ---- 37
Tray, hospital ---- 96
Tree guard ---- 256
Tribus, M ---- 63
Tricycle, new ---- 80
Trouser hanger ---- 144
Trucks, emergency ---- 240
Truhlar, J ---- 246
Truman, Harry ----74, 326
Truman's Health Plan ---- 6
Trumper, Max ---- 168
Trytten, M H ---- 170
Tseng C K ---- 199
Tuberculosis germs killed 104
Tuberculosis treatment ---- 308, 825
Tuberculosis vaccine ---- 391
Tubes, electronic ---- 224
Tularemia remedy ---- 117
Turbine, engine ---- 169
Turbine generator ---- 215
Turbo-supercharger ---- 137
"Turrialba" ---- 62
Tuve, Antony ---- 274
Tuve, M A ---- 180
Twins, albino ---- 279
Twin-lens camera ---- 352
Tyler, Richard G ---- 36
Typewriter, motor driven 256
Typhoid epidemic ---- 131
Typhoons hunted ---- 76

UHF radio ---- 14
Ulcer sufferers ---- 364
Ulcers, stomach ---- 40
Ulmer, F A ---- 69
UNESCO ---- 136
Unimak island, tidal wave 227
Universe, age of ---- 204
University, World ---- 149
UNO Health Organization 389
Uranium 235 ----8, 391
Uranium for A-bombs ---- 213

V-2 rocket---307, 313, 328, 342
Vaccine increases food ---- 174
Vaccines, new ---- 339
Vacuum tube ---- 8
Valentine Willard L ---- 310
Valice and chair ---- 336
Valve, conical ---- 392
Van Allen, James Alfred ---- 287
Van de Water, Marjorie 26, 90, 201
van Dien, Elsa ---- 71
Van Evera, B D ---- 218
Van Riper, C R ---- 2
Van Riper, H E ---- 332
Van Voorhis, Cletus C ---- 345
Vandenberg Hoyt S ---- 195
Vaughan, T W ---- 274
Vegetables, spoiled ---- 143
Veniaminov, Ivan ---- 72
Venus ---- 330
Venus, molecular bands ---- 371
Venus still brightening ---- 266
Vermiculite ---- 40
Verne, Jules ---- 307
Vessels, preserved ---- 53
Vila, George A ---- 190
Virginia talent search ---- 329
Viru Valley ---- 397
Virus research technic ---- 217
Vitamin A, synthetic ---- 35
Vitamin B complex ---- 345
Vitamin C, new source ---- 152
Vitamin D ---- 377
Vitamin lack ---- 249
Vitamins, fight for ---- 297
Vitamins from manure ---- 72
Vogt, William ---- 111
Volcano not dangerous ---- 120
von Koenigswald, G H R 25
Vought, Russell R. ---- 377
VT fuze guarded ---- 68
Vyssotsky, A N ---- 82

Wachtel, Henry K ---- 296
Wahlen, G E ---- 74
Watt, Alden H ---- 248
Waksman, Selma A 138, 167, 327
Walch, Edward C ---- 117
Walker, Charlotte F ---- 355
Walker, J E ---- 217
Walker, R V L ---- 174
Wall holder, plastic ---- 384
Wallace, Henry ----163, 366
Wallace, Marcel ---- 265
Wallerstein, Harry ---- 357
Walters, Robert F ---- 3
War houses converted ---- 15
War memorial, "living" ---- 363
Ward, Henry B ---- 310
Warner, Edward ---- 348
Warner, S ---- 246
Warren, Capt Shields ---- 179, 294
Waltenberg, R ---- 54
Waltman, F. S ---- 197
Washburn, H W ---- 405
Wasselle, Leonard A ---- 246
Wastebasket, metal ---- 192
Water on brain, prevention of ---- 182
Waterlily ---- 382
Watters, Robert L ---- 374
Watts, J W ---- 245
Way, Katharine ---- 415
Weapons, new ---- 218
Weather, at extreme heights ---- 232
Weather forecasting ---- 404
Webb, Hanor A ---- 301
Weed, Lewis H ---- 39
Weed extractor ---- 256
Weed-killers, synthetic ---- 121
Weeds, war on ---- 362
Weiant, Elizabeth A ---- 217
Weidenreich, Franz ---- 25
Weidlein, Edward R ---- 190
Weinroth, Leonard A ---- 359
Weiss, Edward ---- 325
Welch, Henry ---- 344
Wells, H W ---- 245
Wells, Nelson ---- 14
Welkman, Chester H ---- 274
West, T F ---- 56
Westendorp, W F ---- 396
Westinghouse winners ---- 165
Wetmore, A ----72, 310
Wexler, H ---- 60
Wheelbarrow ---- 176
Whipple, George H ---- 119
Whips, trailing ---- 416
White, Philip R ---- 233
White, W C ---- 311
White Sands, N M ---- 307
Whiting, Anna R ---- 153
Whitmore, Frank C --25 274
Whitney, Lester V ---- 248
Whittle, Frank ---- 13
Wickson, Mary ---- 350
Wiener, B A ---- 198
Wigglers ---- 318
Wigner, E P ---- 415
Wilcox, Doyle E ---- 405
Williams, C M ---- 56
Williams, D B ---- 38
Williams, Emma T R ---- 82
Williams, Howel ---- 120
Williams, Leslie ---- 139
Williams, Robert R ---- 137
Williams, Robley C ---- 137
Williams, Roger J --246, 274
Willis, F H ---- 281
Wind tunnel, German---73, 239
Wind tunnel, largest ---- 194
Wind-finding equipment ---- 180
Windle, W F ---- 183
Winckler, John R ---- 345
Windows on south side ---- 376
Wine-making ---- 317
Winn, O H ---- 127
Winne, Harry A --- 214, 380
Winter drought ---- 12
Winter fruits ---- 28
Wire, "printed" ---- 133
Wirth, Louis ---- 277
Wittbecker, Emerson L 247
Wittich, Fred W ---- 194
Woldenberg, Max ---- 5
Wolfenstein, Martha ---- 297
Wolves, scarce ---- 60
Wood alcohol poisoning ---- 35
Wood, E H ---- 183
Wood, R T ---- 389
Wood waste ---- 329
Woodruff, A M ---- 42
Woodring, Wendell P ---- 274
Woodward R B ---- 219
Woodward, C F ---- 41
Woolpert, Oram ---- 18
Work necessary ---- 200
World health plan, new ---- 389
Wrench, new ---- 80
Wright, C C ---- 278
Wright, E C ---- 155
Wright, T P ---- 72
Writing pad holder ---- 304
Wu, C S ---- 211
Wyckoff, Ralph W G ---- 137
Wyler, Joseph A ---- 137

XP-83 ---- 7
XP-84 Thunderjet ---- 376
X-ray for cancer ---- 265
X-ray machines, mobile ---- 392

Yarn, plastic-coated ----
Yeast, low on vitamins ---- 281
Yellott, John I ---- 284
Youmans, Guy P ---- 339
Young, J L ---- 328

Zarur, Jorge ---- 312
Zavala, Silvio ---- 312
Zernike, F ---- 390
Zirin, Harold ---- 163
Zubia, Eduardo ---- 312
Zubin, Joseph ---- 216

ERRATA, Vol. 49, Nos. 1-26, January-June, 1946

PAGE	TITLE BEGINS	CORRECTIONS
101	Fewer Vitamins	Par 5, line 10, *delete* and teeth
103	Caption	Line 2, weather *for* winter's cold
	Insects Hide in Woods	Col 2, line 4, *delete* from the cold
140	Peacetime Atomic Energy	Col 3, par 7, line 2, 10,000,000 *for* 10,000
148	Nazis Lagged	Col 2, lines 9 and 14, Drahtband *for* Draftband
150	Science Talent Institute	Subhead, line 1, Fifth *for* Fourth
167	Birth of Atom Splitting	Subhead, line 3, and Par 3, line 6, *to read*, uranium into radium and thence into lead
278	Synthetic Rubber Theory	Col 3, line 12, Irving *for* A C
361	Signal Growth Potential	Heading *to read*, Soaked Corn Grains Signal Growth Potential

ASTRONOMY

Mercury Appears Again

This seldom-seen planet appears for the second time this year. Venus, Mars and Jupiter are also visible and very bright during July.

By JAMES STOKLEY

➤ THE EARLY days of July bring us, for the second time this year, a chance to observe the seldom-seen planet Mercury On July 5 it is at its farthest east of the sun, so it remains visible above the western horizon for a short time after the sun goes down For a few days before and after this it should be possible to get a glimpse of it at twilight just above the horizon and a little to the north of the west point

Higher than Mercury, many times brighter and visible through the month is the next planet out from the sun, Venus It is in the constellation of Leo, the lion, and about July 13 it passes very close to the star Regulus On the accompanying maps, drawn for July 15, it is shown after it has gone past. These, by the way, depict the heavens as at 10 00 p m, standard time (or 11 00 p m D S T) at the beginning of the month, and an hour earlier in the middle Since Mercury sets before this hour, it is not shown

Mars in Leo

Mars is a little higher still, in the constellation of Leo, the lion, but about a hundred and twentieth as bright as Venus, for it is now far out beyond the sun. And still higher and farther to the south, in the next constellation of Virgo, the virgin, stands Jupiter It is brighter than any other star or planet, except for Venus, which exceeds it 5.75 times The only other planet that ever is visible to the naked eye, Saturn, is now in the constellation of Cancer, the crab, and too close to the sun to be seen in July

Among the stars which, like the sun, shine with their own light, Vega, high in the east in Lyra, the lyre, is brightest Below it is the northern cross, now on its side, which is part of Cygnus, the swan, and of which Deneb is the brightest star Lower, and a little farther south, is the figure of Aquila, the eagle, with Altair One faint star just above this, and another the same distance below, help in locating it.

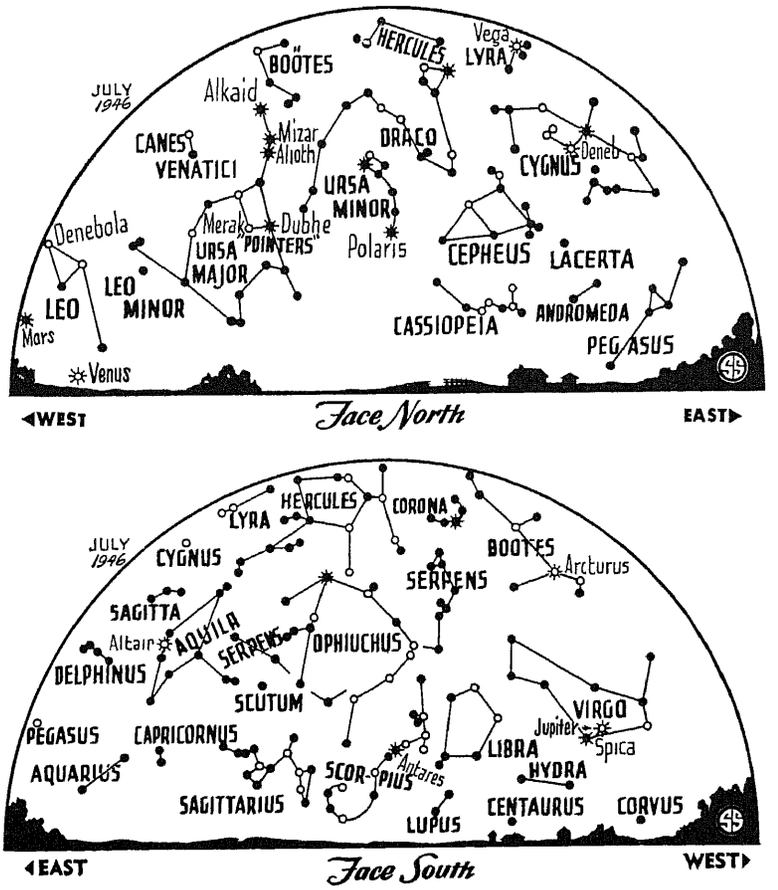
In the northwest, hanging downward from the end of the handle, is the Great Dipper, in Ursa Major, the great bear At the bottom are the two stars known as the pointers, which indicate the direction of Polaris, the pole star The Dipper contains no first magnitude stars, but its handle, if you follow its curve southwards, shows the direction of two others The first is Arcturus, in Bootes, the bear driver, and the next is Spica, in Virgo, the group where Jupiter is now residing

Finally, there is one more first magnitude star on our maps This is Antares, in Scorpius, the scorpion, low in the south, a constellation that is characterized by the curved row of stars that form the scorpion's tail Antares is red in color, which also serves as a means of identification

Though practically everyone knows that Mercury is the innermost of the planets, few have ever seen it Most of the time it is so nearly in the same direction as the sun that it is lost in the glare of that body Once every 88 days it makes a revolution around the sun, but during this time, which is the Mercurian "year," the earth also has advanced in its orbit This means that the time which Mercury requires to return to the same position with respect to us is 116 days, and astronomers call this its 'synodic period"

Mercury Now Farthest East

Once in this period it is farthest west of the sun, as it was on April 23 Then it rises ahead of the sun, and may be glimpsed near the horizon in the morning twilight Also once in each synodic period it is farthest east of the sun, and follows it across the sky, remaining briefly above the western horizon at dusk It was at such a position on March



9, and again on July 5 This is why the early days of July bring us one of the rare chances we have to see it

At an average of 35,946,000 miles from the sun, Mercury's distance is about 39% of that of the earth's. This means that it receives far more heat from the sun than we do—about seven times as much. Also it has no atmosphere to ameliorate this flood of radiation The reason for this is that it is not big enough to hold a layer of air, even if we could provide it with one. Though we are used to thinking of the force of gravity as attracting objects big enough to see and feel, it also pulls on the molecules of nitrogen and oxygen that make up our atmosphere Without this pull the movements of these molecules would soon take the atmosphere away, never to return. With its smaller size the pull of gravitation on Mercury is only about a quarter as much as ours This is not enough to hold an atmosphere against its own tendency to disperse

But despite Mercury's proximity to the sun, a few years ago Mt. Wilson astronomers, using a heat-measuring device called a thermocouple on their great 100-inch telescope, the largest in the world, found that part of Mercury, at least, was not radiating any appreciable heat This means that its temperature is close to the absolute zero of 460 degrees below zero Fahrenheit This was for the half of the planet turned away from the sun The hemisphere toward it, on the other hand, was found to be about 660 degrees Fahrenheit, above that at which lead will melt.

This is evidence that the planet turns once on its axis in the same 88-day period that it takes to encircle the sun. It always keeps the same face toward that body, just as the moon does toward the earth Probably it does so for the same reason Though there is no water on Mercury, it may once have been in a more plastic condition than it is now, and the sun would have caused great tides As it revolved on its axis, these tides would have had a braking effect, With the planet always turning the same part sunwards, the braking action ceases, and we end with the condition that now prevails

Celestial Time Table for July

July	EST	
1	2 18 p m	Moon passes Venus
3	1 59 a m	Moon passes Mars
	6 00 a m	Earth farthest from sun, distance 94,452,000 miles
5	2 00 p m	Mercury farthest east of sun
6	12 15 a m	Moon in first quarter
	6 28 a m	Moon passes Jupiter
10	3 00 a m	Moon farthest from earth, distance 251,900 miles
14	4 22 a m	Full moon
21	2 52 p m	Moon in last quarter
25	10 00 p m	Moon nearest, distance 226,000 miles
28	6 53 a m	New moon
31	9 53 a m	Moon passes Venus
	5 43 p m	Moon passes Mars

Subtract one hour for CST, two hours for MST, and three for PST Add one hour for the corresponding Daylight Saving Time

Science News Letter, June 29, 1946

PHYSICS

200-Foot Chimney Aids in Study of Smoke Nuisance

➤ A HIGH, smoking chimney usually connotes industrial activity at its base But scientists at the meeting of the American Geophysical Union heard Dr Phil E. Church of the University of Washington tell of a 200-foot smokestack with no factory attached, put up purely for the purpose of giving off smoke It was smoke without a fire, too, for it consisted of the white oil-fog emitted by an Army M-1 smoke generator such as was used during the war to conceal troop movements and military installations

Purpose of this fireless, factoryless smokestack was to study the behavior of smoke in the air at various wind velocities, and its degree of dilution with air at various distances from the source These are of course matters of much concern in the placing of factories and power plants, if complaints about smoke nuisance are to be avoided

Amounts of smoke in the air were determined by drawing air through a tube past a photocell. Even very small quantities of the oil-fog would cause a definite shift of the pointer on the reading instrument The "smoke-eye" was mounted on a truck that could travel over any terrain to reach a spot where a reading was wanted.

Science News Letter, June 29, 1946

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Do You Know?

World records of lifting heavy loads to great heights by airplanes have been recently broken by B-29 Army planes; one lifted a 2,200-pound load to 45,000 feet altitude, and another 11,000 pounds to 42,780 feet.

Irish moss collecting is the oldest seaweed industry in America, known also as carrageen, it has been harvested for a century to make blancmange, and now for carrageenin, a stabilizer in chocolate milk

With increased use of gas turbines and jet planes, the total amount of high-octane *fuels* for aviation will decrease because in them octane number is not the critical characteristic

German jams during the war, called mixed fruit jams, were made from a combination of pumpkin, rhubarb, green tomatoes, beets and various fruits

The *Torrey pine* is found only on a strip of land two miles wide and eight miles long near San Diego, Calif

American *"desert forests"* are not timberlands but fantastic areas of tree-lilies, cacti, yucca and similar growths

Britain's *bread loaf* is now seven-eighths as heavy as its former loaf

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DENTISTRY

Susceptibility to Tooth Decay May Be Inherited

➤ THE MOTHER who says, "My daughter gets her poor teeth from me," implying that there is some inherited factor in dental disease, is propably right

Susceptibility to tooth decay seems to run in a family, very likely is inherited and may be sex-linked, Dr Henry Klein, Senior Dental Officer, U. S Public Health Service, found from a study of 5,400 parents and children in 1,150 families Details of the study, made on families of Japanese ancestry at the Colorado River Relocation Center, are reported in the *Journal of the American Dental Association* (June)

When both parents had little or no signs of dental disease, their children also had good teeth When both parents had poor teeth, the children also had much dental trouble. If one parent had good teeth and the other had medium or very bad teeth, the children had more tooth decay than children whose parents both had good teeth, but less than that seen in children with both parents having poor teeth

The state of the mother's teeth seemed more closely related to that of the daughter's than the state of the father's teeth did

Science News Letter, June 29, 1946

CHEMISTRY

"T-13" Keeps Down Lint, Dust and Bacteria

➤ IF YOU WANT to keep lint, dust and disease-spreading bacteria from scattering around your house from bedding, clothes, towels and floors, the U. S Army has the answer to your problem

An oil emulsifying agent developed during the war to cut down the spread of respiratory diseases in Army barracks has just been released The oil emulsion, known as "T-13", was applied to woolen and cotton materials during the final rinse in the normal laundering process Quantities of the oil depended on the type of material and 10 or 12 minutes more time was required in the normal laundering process, the Army reports.

"T-13" contains a medicinal mineral oil and "Triton NE," a non-ionic, emulsifying agent

Dry cleaning removes the emulsion completely, but ordinary washing will not.

Science News Letter, June 29, 1946

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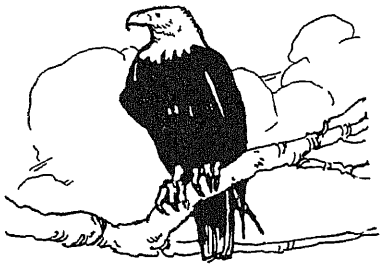
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ORNITHOLOGY

NATURE RAMBLINGS
by Frank Thone



➤ ON NATIONAL HOLIDAYS, especially Independence Day, we are wont to swell our chests with pride at the thought of him, while our bell-tongued orators laud him above the clouds Yet even when they laud him as a "glorious bird of prey" they are indicting him For by very necessity, a bird or beast of prey must attack animals smaller or weaker than itself And as a nation we have instinctively abhorred such a course, our history books are rather shamefaced about the time or two we have done that kind of thing

Anyway, the bald eagle is not primarily a bird of prey True, it does catch some of its food alive—though the stories of eagles carrying off children do not seem well founded But to a very large extent the bald eagle feeds on what it finds already dead It does not go in for carrion ripe to the taste of a buzzard, but if it finds a dead rabbit or lamb fairly fresh it will leave only scraps for its more ignoble distant cousin One of Audubon's finest plates shows a bald eagle with its talons in a huge catfish that is evidently quite dead That is not imagination Audubon saw the things he painted

These somewhat plebian traits of the bald eagle were well known to our earlier scientists. It was not they who chose him as the national emblem, but the politicians of our earlier day Benjamin Franklin, who was a real scientist as well as a real statesman, protested vigorously but to no avail, he wanted the turkey-gobbler emblazoned on the U S Great Seal and coins instead.

It made no difference: the heraldic eagle was popular, and will undoubtedly remain where he is, so long as we are a nation We'll overlook his shortcomings, just as we find excuses for the faults and peccadillos of our heroes

But while we enshrine this largely imaginary eagle, we are doing our utmost to exterminate the real ones Worst blow was the felling of the primeval forest that once covered much of this land, eagles choose dead high trees as nest sites when they can, and few such sites remain now

Nowadays the eagle is a harried and hunted bird in one of the few places where he survives in number—the Alaska coast Fisheries men and sheepmen alike malign him, and having given him a bad name they shoot him for it whenever they can

We Americans are a strangely self-contradictory people

Science News Letter, June 29, 1946

RADIO

Shoran Will Help Chart the World

➤ A WARTIME RADAR navigation device, used to assist bombing through overcast, will now be employed in charting the earth's surface Shoran, the electronic device is called, the word is coined from "short-range" radar

Lt Col Carl I Aslakson of the Army Air Forces has declared that with Shoran "it would be possible to establish a geodetic control network of the entire world and plot the distance of every point within a few feet of every other point on the globe"

The method has been checked and proved in the Denver area, and in addition, has been used by the U S. Coast and Geodetic Survey in surveys of the ocean bottom in Alaska It will soon be used to chart the coast of Maine, and also in the Caribbean area

Shoran makes use of high frequency radio waves which are transmitted and measured in terms of miles, and down to feet where necessary As developed for bombing, the bomber was equipped with two transmitters which sent pulse signals to two ground stations These, located at least 100 miles apart, received the signals and re-broadcast them back to the plane The interval of time between the sending and the receiving of the signals was measured electronically and translated into distance

With the distance between the stations known, and the distance from each determined by the radio signals, the mathematical method of triangulation accurately gave the plane its location The pilot had no figuring to do, the triangulation was automatically computed by electronic devices

Science News Letter, June 29, 1946

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THE FEVER BARK TREE The Pageant of Quinine—M L Dural-Reynals—*Doubleday,* 275 p, $2 75 The story of man's fight against malaria from the time when it killed Alexander of Macedon to World War II, and of quinine, which, until recently, has been the only effective agent for controlling the disease

HANDBOOK OF LIZARDS Lizards of the United States and Canada—Hobart M Smith—*Comstock,* 557 p, illus, $5 75 An examination of 136 species of lizards under the following topics range, size, color, scalation, recognition characters, habitat, habits, and problems for future study

LINCOLN'S INCENTIVE SYSTEM—James F Lincoln—*McGraw,* 192 p, illus and diagrs, $2 A theory of incentive management which presents a philosophy of industry and life, and depends for its success on the development in the individual of his latent abilities

MODERN METALCRAFT—John L Feirer—*Manual Arts Press,* 288 p, tables and illus, $3 50 A treatment of processes in art metal work, giving illustrations of finished articles and the steps in their making, various methods in filing, shaping, soldering, heat-treating and other finishing processes

THE PSYCHIATRY OF ENDURING PEACE AND SOCIAL PROGRESS—G B Chisholm, M D —*William Alanson White Psychiatric Foundation,* 44 p, paper, 40 cents The William Alanson White Memorial Lectures by G B Chisholm, M D, with foreword by Abe Fortas and discussion by Henry A Wallace, Watson B Miller, Samuel W Hamilton, Ross McC Chapman, and Harry Stack Sullivan

QUALITATIVE ORGANIC MICROANALYSIS—Frank Schneider—*Wiley,* 218 p, tables and diagrs, $3 50 Instructions for the preparation, isolation, purification and identification of very small quantities of organic compounds

THE STAR ATLAS AND NAVIGATION ENCYCLOPEDIA—S S Rabl—*Cornell Maritime,* 161 p, illus, $5 How to determine speed, distance, time, and position, how to take bearings with a radio direction finder, how to use the sextant, how to use the NAUTICAL ALMANAC, H O 208, H O 211, and H O 214, how to use the stars in navigating

Science News Letter, June 29, 1946

CHEMISTRY

Radioactive Carbon 14

THE METHOD of manufacturing by means of atomic energy the radioactive kind of carbon isotope 14 that may result in discovering the causes of diseases and many biological and chemical processes was made known in a paper before the American Physical Society by L D Norris, A H Snell, E P. Meiners, Jr, and L Slotin of the Clinton Laboratories, Oak Ridge, Tenn

The fission of uranium 235 or plutonium in what is called a "chain reacting pile" supplies the atomic bombardment that creates the special kind of "tagged" carbon The process actually used at Clinton Laboratories is continuous extraction from a liquid such as ammonium nitrate The solution is circulated through the pile with a glass centrifugal pump. Nitrogen in the ammonium nitrate is transmuted by neutrons and protons into the carbon isotope 14, which is not only radioactive but is two atomic weight units heavier than the most ordinary kind of carbon in nature The carbon is carried out, mostly as carbon dioxide, with other gases resulting from radiation decomposition of the liquid The carbon is precipitated from the gas stream as barium carbonate About 5% concentration of the carbon 14 is obtained

Batches of solid nitrogenous material can also be irradiated to obtain the useful carbon radioisotope or continuous extraction from some kind of an emanating nitrogenous substance can be used

About 20 different pairs of atomic nuclei can be produced when an atom of uranium or plutonium divides or fissions with a release of the atomic energy, a paper by Dr E P Wigner of Princeton and Dr Katharine Way of the Metallurgical Laboratory, Chicago, reported. Each resulting nucleus is in general unstable and goes through several radioactive beta-ray transitions before it reaches stability Each transition has its own peculiar radiations and lifetime.

Science News Letter, June 29, 1946

Englishmen were long afraid to eat *tomatoes* because the plant is a close relative of the European deadly nightshade

ENGINEERING

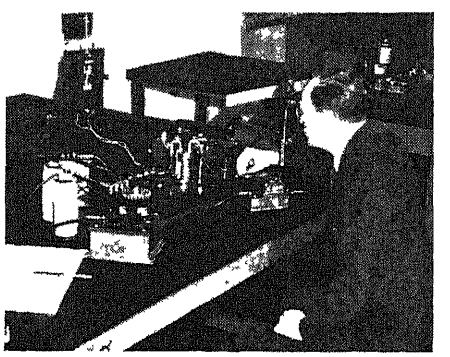
Tractor Hydraulic Device Works Trailer Mechanism

A SIMPLE, relatively inexpensive attachment to an ordinary light tractor of the wheeled type enables the tractor to be used with scrapers and other earth-moving machines having hydraulically operated mechanism Patent 2,402,449 has just been awarded for this invention to Harvey W Rockwell, Cedar Rapids, Iowa, who has assigned it to the Laplant-Choate Manufacturing Company, Inc, of the same city

The invention provides a pump, oil tank and control valve all in a single unit in a single housing which may be easily attached or removed from the front of the tractor A control is within reach of the driver The pump is operated by the tractor engine

The oil tank is mounted just above the pump, and over it is the control valve from which supply lines extend along opposite sides of the tractor to the rear These, by simple connectors, are attached to the hydraulic mechanism in the equipment pulled by the tractor

Science News Letter, June 29, 1946



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⚙ *STOWAWAY BED, in reality mere- a mattress and pillow in one piece, is made of a cotton fabric impregnated with a synthetic rubber compound, and is filled with air when used. When inflated and laid on the floor, it is a comfortable cot, deflated, it takes less space than a blanket.*

Science News Letter, June 29, 1946

⚙ *"WHIPS" TRAILING from the wings and tail of airplanes discharge the static electricity created by all-metal planes, that interferes with radio reception The whips are 10-inch cotton ropes impregnated with a silver compound which gives electrical conductivity Plastic tubes enclose nearly nine inches of the ropes*

Science News Letter, June 29, 1946

⚙ *IMAGE CORRECTING lens, together with a reflecting glass mirror, enlarges the television picture on a five-inch cathode-ray tube to fill a screen 18 by 24 inches in size. Wave-like curves in the lens compensate for spherical aberrations introduced into the pictures by the reflecting mirror.*

Science News Letter, June 29, 1946

⚙ *ANTENNA for FM (frequency modulation) broadcasting is called the "clover-leaf" because its radiating units are in the shape of a four-leaf clover The antenna is made up of two or more vertically stacked radiating units, spaced a half-wave length apart*

Science News Letter, June 29, 1946

⚙ *COILED CORD for ironing, shown in the picture, has covering of the synthetic rubber, neoprene, which resists*



abrasion, tearing and heat from the iron if touched momentarily. The springy cord will stretch six times its retracted length

Science News Letter, June 29, 1946

⚙ *TRANSPARENT envelope, made in various sizes for cards, shop work orders, maps, blueprints and record sheets, has plastic faces bound with leatherette edges The plastic is flame- and moisture-proof and is uninjured by heat or oil.*

Science News Letter, June 29, 1946

⚙ *DRAFTING instrument molded in two parts of a transparent yellow plastic, is a combination graduated square, with a removable miter arm pivoted in t center of a circular projection at the ou angle of the square. Back edges of th legs of the square have French cu ves*

Science News Letter, June 29, 194

⚙ *PAGE-TURNING device for invalids has a rotating drum with a thre attached on which are tied metal clips a double book-width intervals The thread, passed over the book and clips fixed in order to succeeding pages, pulls one page over at a time as the drum rotates. Rotation is controlled by a chin-operated electric switch*

Science News Letter, June 29, 1946

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Question Box

ARCHAEOLOGY

What troubles did early Indians have which were similar to ours? p 406

ASTRONOMY

Mercury has appeared how many times this year? p. 407.

BIOCHEMISTRY

Radioactive iron tracer experiments prove hemoglobin is manufactured by what body process? p 405

CHEMISTRY

What method recently developed may be used to discover causes of diseases and many other chemical and biological processes? p 411.

What method was used in the invention of two new sugars? p. 403

What oil emulsifying agent developed during the war keeps lint, dust and bacteria from spreading? p. 409.

DENTISTRY

What studies show persons may inherit tooth decay? p 409

ENGINEERING

What are the advantages of the new hydraulic tractor device? p. 411

ORNITHOLOGY

What injustices have Americans inflicted upon the eagle? p 410

PHYSICS

What is one of the most important developments from the atomic bomb project? p 406

RADIO

How can radio transmission forecast the weather? p 404

What electronic device will now be used to chart the earth's surface? p. 410

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